ENGINEERING NEWS
AND
AMERICAN RAILWAY JOURNAL.

Vol. XXXIV, No. 21.

TABLE OF CONTENTS.

ENGINEERING NEWS OF THE WEEK.... 337, 349
The Granite Quarries of Stone Mountain, Georgia (Illustrated) 338
The Chicago Main Drainage Channel, XXI. (with inset, illustrated)..... 338
The Slide Rule and How to Use It (Illustrated).. 340
The Colwell Furnace for Light Inflammable Refuse, New York city (illustrated)..... 342
New Publication Rules of the American Society of Civil Engineers..... 343
A Severe Test of a Masonry Pier (Illustrated)..... 343
Collision on the Cable Railway on the Brooklyn Bridge 343
Notes of Travel (Editorial Correspondence) (Illustrated) 348
Book Reviews..... 350
EDITORIAL NOTES..... 344
Safe Steam Piping in Power Stations—European Practice in Laying Out City Streets—Instructions for the Use of the Slide Rule—The Reported Resumption of Work at Panama—The Value of Street Railway and Other City Franchises.
EDITORIAL.
Combinations Among Contractors..... 345
LETTERS TO THE EDITOR..... 346
Longitudinal Angle Stiffeners for Chords of Plate Girders—A Problem in Statics (Illustrated)—Floor Construction of the Manhattan Bank Building—Tests of Efficiency of Nut Locks—Concerning Anti-Rust Paint—The Proper Consistency of Concrete After Mixing—Notes and Queries.

The record for rapid erection of tall steel buildings has been broken by the erection of 13½ stories of the ironwork for the Fisher Building, in Chicago, in 14 days. Previous to this performance, the erection of nine stories of the Reliance Building, in Chicago, in two weeks was the best record. Both of these buildings were illustrated and described in our issue of Oct. 17. The Fisher Building is 18 stories, or 235 ft., high, and covers a ground area of 70 × 100 ft. Work was begun excavating for the foundations July 3, and by the last of August they were ready for the ironwork. The first iron arrived Oct. 12, and work was begun, but it was not until Oct. 19 that the iron could be had as fast as wanted. From Oct. 19 to Nov. 2, 14 days, 13½ stories were erected. On Nov. 14 the 18th story was finished, and on Nov. 17 the attic and roof had been completed. From Oct. 12 to Nov. 17, inclusive, there were 37 days, on six of which no work was done, which makes the time 31 days for erecting the whole framework for 18 stories, attic and roof. Work is in progress upon the terra cotta covering, and by Dec. 1 it is expected that the building will be entirely closed in.

The highest speed ever attained by a warship, other than a torpedo vessel, was made Nov. 2 by the cruiser "Buenos Aires" on its trial trip in the North Sea. The highest record was a mile in 2 mins. 33 secs., or at the rate of 23.529 miles per hour, thus beating the record of 23.073 miles held by the U. S. triple-screw cruiser "Minneapolis." The "Buenos Aires" is a twin-screw cruiser, with a steel hull sheathed with teak and copper, and was built for the Argentine Republic by Armstrong, Mitchell & Co., of Newcastle, England. It is 396 ft. long between perpendiculars, 424 ft. long over all, 47 ft. 2 ins. beam, 18 ft. 3 ins. mean draft at a displacement of 4,740 tons. The engines, built by Humphrys, Tennant & Co., of London, are four-cylinder, triple-expansion engines, with cylinders 40, 60, 66 and 66 ins. diameter, and 36 ins. stroke. The estimated power under forced draft is 17,000 I. HP., and during the trial, under natural draft, it was approximately 14,000 I. HP. The boiler pressure was 155 lbs. per sq. in., and the engines averaged 151 revolutions per minute. The runs over the measured mile were made as follows:

	Time, mins.	secs.	Speed, m. p. h.		Time, mins.	secs.	Speed, m. p. h.
1st run.	2	47½	21.493	4th run.	2	33	23.529
2d " .	2	34	23.377	5th " .	2	50	22.642
3d " .	2	41	22.360	6th " .	2	37	22.930

The injury to the battleship "Texas" has been officially reported upon by Naval Constructor F. F. Bowles. He describes the process of docking this ship, and then details the damage done. He concludes by stating that the ship was carefully docked, and had the "Texas" ben properly undocked as soon as painted, instead of delaying for a change of screws, no buckling would have taken place. Mr. Bowles reports the structural strength of the "Texas" as unaffected, and recommends that the cracks in the cement lining be repaired, at a cost of $306, and that "two angle clips should be worked in on each floor to stiffen the floors and brackets." The regular inspection board will again examine the "Texas" after her steam trial, with reference to other minor changes recommended. The report of Constructor Bowles has been approved by Chief Constructor Hichborn, Chief of the Bureau of Construction.

Bids are asked for battleships Nos. 5 and 6 by Secretary of the Navy Herbert. The plans call for the construction of first-class vessels in every essential, to cost about $4,000,000 without armament. The general dimensions are as follows:

Length on load water-line	568 ft.
Breadth at " " "	72 "
Mean draft at " " "	23½"
Normal displacement, about	11,500 tons
Total coal capacity, loose stowage	1,210 "
Coal carried at normal displacement	410 "

The main battery will be four 13-in., four 8-in., and 14 5-in. guns. The secondary battery will contain twenty 6 pdrs., four 1 pdr., four machine guns, and one field gun. The ships are to be driven by twin screws and vertical triple-expansion engines, one for each screw, in separate compartments. The side-armor belt will be 15 ins. thick for a mean depth of 7½ ft., tapering to 4 ins. in thickness at the ends. The transverse armor will be 8 ins. thick; the barbettes for the 15-in. guns will be 15 ins. thick, reduced to 12 ins. in the rear, with 17-in. turret-port plates. Above the armor belt on the ship's side will be 5-in. steel armor, and the protecting deck will be 3 and 2¼ ins. thick. The two turrets will be double, carrying the 8-in. above the 13-in. guns, and they will be protected by 9 and 11-in. armor. There will be five torpedo boats, and two hollow military masts, with fighting tops. The contract speed is 16 knots, for four consecutive hours, with a penalty for deficiency in speed, instead of a premium for excess.

A course in experimental engineering is about to be established in the U. S. Naval Academy at Annapolis, Md., under direction of Chief Engineer C. W. Rae, U. S. N. A plant is being installed consisting of an experimental boiler and triple-expansion engine, with condenser arranged for weighing and measuring the water of condensation, with all the necessary dynamometers, continuous indicators and other minor apparatus.

An improved Gatling gun, operated by an electric motor, has lately been tested by the Naval Rapid-Fire Gun Board. This gun has a caliber of 0.236 in., and the barrels are 26 ins. long, with the general features remaining unchanged. But an electrical attachment is used, which, it is claimed, permits the firing of 1,800 shots per minute. In the late tests, without the motor, 20 rounds were fired in 3 seconds, 40 in 5 seconds, 50 in 6 seconds, 100 in 7 seconds, 200 in 13 seconds, and 400 rounds in 37 seconds. The electric motor was then fitted to the gun, with the electric current regulated by a switch, and the connection with the firing mechanism made and broken by a push-button. The motor and casing weighed 106 lbs., and the length was 21⅝ ins., lengthening the gun 20 ins. While several hundred shots were fired, the Board does not state the rate of firing, but the only interruptions were due to temporary jams in the gun or feed strips, and the motor acted smoothly and regularly.

The imperative need of modern coast defenses is pointed out in the annual report of General Craighill, Chief of Engineers, U. S. A. The Board of Engineers has prepared projects for the artillery defense of Philadelphia, Key West, San Diego, mouth of the Columbia River, Galveston and Puget Sound, with the addition of mine defences at various places. General Craighill illustrates the delay complained of by stating that the Portland project calls for 38 guns of large caliber and 48 mortars, while emplacements are being built for three guns only; the New York project calls for 45 guns and 176 mortars, while emplacements are being built for 11 guns and 32 mortars. The appropriations for the repair of fortifications and for the acquisition of new sites are altogether inadequate, says General Craighill, and he asks that these be increased. General Craighill submits a detailed statement of the river and harbor improvements, and shows that $15,440,994 were expended on this work in the last fiscal year, exclusive of Mississippi and Missouri River expenditures. The total for the last two years is $30,904,084. For the next two years he submits estimates amounting to $21,016,197, only, for works, the plans for which have been approved by Congress and appropriations made.

Fire Island light is to be abolished, by order of the Lighthouse Board, and a lightship, connected by cable with the mainland, is to be permanently stationed six miles due south of it. This is the result of many recent complaints that the old light was useless in a fog, and is too near the coast. The Fire Island lighthouse was built in 1826, and rebuilt in 1858; the light stands 186 ft. above the sea level, and can be seen nearly 20 miles in clear weather. It is 37 miles from Navesink Lights, 30 miles from Sandy Hook lightship, and 67 miles from Montauk Point. The 750,000-c. p. light now used is to be transferred to Barnegat Light.

The most serious railway accident of the week was the derailment of an eastbound mail train on the New York Central R. R., near Rome, N.Y., Nov. 19. Four boys, who intended to rob the train, had broken into a section tool house and stolen tools, with which they removed the splice bars and spikes of two opposite rails. The engine and four mail cars were ditched, and one sleeping car upset, the rear sleeping car remaining on the track. The engineman and a tramp were killed, and 10 mail clerks and trainmen were injured. The boys are under arrest.——Another serious accident was a head collision on the Fall Brook R. R., near Jersey Shore Junction, Pa., Nov. 16. A southbound freight train had orders to wait for three sections of a northbound freight train to pass, but the engineman went to sleep, and on awakening pulled out at once, without ascertaining if the three trains had passed. The result was a collision with the third section, in which the fireman of that train was killed and a brakeman injured. The coroner's jury found the engineman and conductor of the southbound train responsible for the accident.——A rear collision between a newspaper train and four cars and a caboose which had broken away from a freight train and were running down grade occurred between Short Hills and Summit, N. J., on the Delaware, Lackawanna & Western R. R., Nov. 13. The engineman was killed and the fireman seriously injured.

The Grand Trunk Ry. is reported to have decided to introduce the block system on its main line.

A cast iron elbow of an 8-in. steam pipe in the engine room of the Brush Electric Light Co., at No. 210 Elizabeth St., New York city, burst on the morning of Nov. 15, filling the engine room with steam and entirely ruining nearly all the belting, causing a loss of about $3,000. There were three men in the room at the time, but only one of them was burned, and he but slightly. The station furnishes current for arc street lights. The engine room, 50 × 100 ft., contains five large Corliss engines, and three long lines of jack shafting, from which belts lead to the dynamo room above. The belting destroyed included four 44-in. and three 30-in. belts, besides a large number of 8-in. belts. The heat of the escaping steam caused the belts to shrivel and curl up, and become as hard as boards. The cement used in making the belts was melted, and the double belts were split apart. So extensive was the damage done that it could not be repaired in time for the lighting on the night of the 15th. The elbow which burst was in a horizontal pipe leading from a main in the adjoining boiler room to one of the engines. About 5 ft. distant there is another elbow in the same pipe, the two elbows, with the short piece of pipe between them, forming an offset in the line. The theory given by the chief engineer of the station to account for the accident is that it was caused by water-hammer. The engine was not running at the time, and an attendant was opening a drip to drain the pipe of any condensed water. The opening of the drip may have caused a sudden rush of steam into the comparatively cold pipe, and a plug of water may have been carried forward with the steam, which, striking the elbow at a high velocity, may have caused its fracture. The elbow was burst into several pieces.

A terrible accident occurred at Cleveland, O., Nov. 16, by an electric car running into the open draw of the Central Viaduct and falling about 100 ft. into the Cuyahoga River. There is a derailing switch 200 ft. from the draw, and the car conductors have to get off and close it, but the conductor failed for some reason to see the red light at the bridge, and he closed the switch and signaled the motorman to go ahead. The accident occurred about 7:30 p. m., during a heavy rain, and the motorman states that he could not see the red lights. The motorman and two passengers jumped, and two of the passengers were taken out of the water alive, but 15 persons (including the conductor) were killed. Gates were closed across the street, but were not strong enough to hold the car. It is said that an automatic circuit breaker, by which the current was automatically cut off from the section between the derailing switch and the bridge whenever the draw was open, had been in use at this point, but was removed for some reason a few weeks ago.

A 20-ton flywheel in the power house of the Albany Ry., at Albany, N. Y., burst Nov. 12. The flying fragments entered a building opposite the power house, killing one man and injuring three.

The overflow of oil from a tank at the Pratt Oil Works, Brooklyn, N. Y., caused the explosion of the tank, and the starting of a fire which resulted in the bursting of seven other tanks. Two men were killed, and the damage to the plant amounts to about $30,000.

The steam pipe of the Pittsburg Iron & Steel Co., at Soho, Pittsburg, Pa., is fitted with branches for future connections, and these are closed by bolted caps. The blowing off of one of these caps on Nov. 14 fatally injured a man who was at work near the pipe.

By the overturning of a retaining wall 18 ft. high in the rear of a row of houses on Harlan Ave., Allegheny, Pa., Nov. 17, several houses were partially destroyed, and several persons injured.

THE GRANITE QUARRIES OF STONE MOUNTAIN, GEORGIA.

One of the excursions of the members of the American Institute of Mining Engineers at its recent meeting was made to Stone Mountain, Ga., about 16 miles east of Atlanta, on the Georgia R. R. The mountain is a solid mass of white granite, rising about 700 ft. above a level plain. The circumference of its base measures seven miles. A good view of the mountain is shown in the accompanying cut. The peculiar streaked appearance of its surface is not, as might be supposed, due to furrows in the rock, or to markings of geological strata, but is simply due to washings by the rain, exposing the clear, white rock beneath the general covering of brownish moss. The mass of rock is entirely of igneous formation, and shows no strata whatever, and it is almost without seam or crack.

STONE MOUNTAIN, GEORGIA.

The mountain was purchased a few years ago by Venable Brothers, of Atlanta, for the sum of $80,000. They are now operating quarries at several points on its surface, and shipping about a million dollars worth of granite per year. They recently filled a contract for 3,000,000 paving blocks for the city of Baltimore. The size of the dimension stones which they are able to cut and ship is limited only by the ability of the railway to transport them, and they are uniform in color, and without flaw or blemish.

The method of opening a quarry is unique. A spot is selected near the base of the mountain, where the slope is comparatively flat, and a hole is drilled about 20 ft. in depth. After charging it with about a half-keg of powder, it is tamped thoroughly, to prevent the shot blowing out, and fired. Instead of a conical mass being detached, as might be expected, a horizontal rift is made, which gradually extends, with a noise like rolling, distant thunder, lifting very slightly an area which may be an acre, or more, in extent, the crack finding an outlet at an edge of the area. The statement that such an effect could be produced was received by the visiting engineers with incredulity, until the theory of it was explained, which is as follows: The shot is fired during a very hot day in the summer, when the upper surface of the rock is heated, and the whole mass is exposed to a tremendous internal strain, from expansion, which tends to lift up and shell off the upper surface of the rock. The explosion of the powder gives this existing strain an opportunity to develop and tear the rock in detail as it might be split by a wedge.

After the edge of the rift is exposed, quarrying the rock is begun, the system being entirely that of the plug and feather. To the uninitiated, this may need explanation. A straight row of ¾-in. holes, about a foot apart, and 6 or 8 ins. deep, is drilled parallel to the edge. In each hole are inserted, head downwards, two hardened steel wedges, called feathers, which are semi-cylindrical on one side, and flat beveled to the upper end on the other. The space between them is, therefore, wedge-shaped, and in it is inserted a finely-tapered wedge, or plug, which is driven in between the feathers by heavy blows of a sledge. The plugs are given one blow each in rotation, and the driving is thus kept up for a considerable time—say, five minutes—gradually increasing the strain, until the rock finally develops a minute crack between two adjacent holes. This is soon extended, by continued driving of the wedges, until the rock cracks down to the rift which has been made by the shot, and it may then be removed. The next row of holes is made parallel to the first, 4 ft. 8 ins. behind it, and a block of that thickness is in like manner detached, which is broken up by the same plug and feather method into such sizes as may be desired.

The granite is said to be of excellent quality for building purposes, being both strong and durable, as well as beautiful in appearance. Venable Brothers are now getting out the stone for a large hotel in Atlanta, which will be built entirely of it.

CHICAGO MAIN DRAINAGE CHANNEL.

XXI.

(With Inset.)

Section 15.

The work on Section 15 involved the construction of regulating works to control the outflow of the main channel into the Desplaines River below Lockport; and to provide for these works considerable modification was made in the previous uniform cross-sections of the channel. Fig. 91 shows a part plan of Section 15. It will be seen that the channel, beginning with the regular width of 160 ft. at the north end of the section, begins to widen out about 1,000 ft. from the south end until it reaches a width of 503 ft. at the extreme end. Forming the lower portion of the west wall of this windage basin are the bear-trap dam and gates constituting the regulating works, and from these will run the tailrace which will deliver the discharge to the Desplaines River. The general layout of the work being plain from these drawings, attention may now be turned to the work in detail.

Excavation.

The contract for excavating 36,000 cu. yds. of glacial drift and 639,700 cu. yds. of solid rock, and building 37,400 cu. yds. of retaining wall on Section 15, was let Aug. 29, 1894, to Wright, Meysenberg, Sinclair & Carry, of Chicago, Ill., the prices for the different work being, respectively, 19 cts. per cu. yd., 59 cts. per cu. yd. and $2.35 per cu. yd. This contract, it will be noted, included no part of the regulating works. In devising a plan for doing the excavation, the contractors had to take into consideration: (1) That no spoil could be deposited at a level above 8 ft. above datum; (2) that no material could be wasted on the south side of the channel, and (3) that no material could be wasted opposite any point on the lower 1,000 ft. of the channel. On a portion of the work a considerable length of haul was necessary, while the depth of excavation was small compared with that of the preceding sections, being from 18 ft. to 22 ft.

After carefully considering different methods, the contractors decided (1) to load all blasted rock with steam shovels; (2) to carry the spoil by locomotives and cars on the lower and south end of the section where the width was great, and (3) to convey the spoil by means of cable inclines on the north end of the section where the width was only 160 ft. The chief point of novelty in this is the use of steam shovels in handling the rock.

The rock is first channeled by Ingersoll-Sergeant channelers, and then blasted down and loaded by the steam shovels. Ingersoll-Sergeant drills are used, and the holes put down about 20 ft., sometimes in linear rows and sometimes staggered with each other, or in zigzag rows. The explosive most used is forcite, but Aetna and Atlas powder are also employed. At the south end of the section, where locomotives are used to haul the spoil, the loading is done by two Bucyrus special shovels. These shovels load into 5-cu. yd. cars, which are hauled in trains of 10 cars. Two locomotives are used. Fig. 92 shows one of the steam shovels loading rock. These shovels differ from the ordinary shovel for handling earth only in the construction of the dipper. This is 2¼ cu. yds. in capacity and rather shallow, with three teeth, the middle tooth being straight and the two side teeth inclined toward the middle tooth, as is clearly shown in Fig. 93.

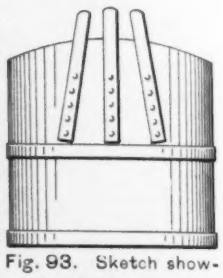


Fig. 93. Sketch showing Arrargement of Dipper Teeth for Handling Rock.

The following figures, taken from the records of Division Engineer Charles L. Harrison, show the output of the shovels for four months, and may be considered as a fair general average of what they are doing on the canal:

Month.	No. 10-hour shifts worked.	Total cu. yds. exc.	Cu. yds. exc. per shift.
May, 1895	108.9	29,000	266
June, "	99.0	28,850	291
July, "	96.0	29,000	302
Aug., "	102.4	31,800	310

The maximum output of one shovel in 10 hours has been 600 cu. yds. These figures show the output of rock in place; when blasted, the volume increases to about 1.8 times its original bulk.

Where the cable inclines are used, the method of channeling, drilling and blasting the rock is practically the same as that just described, but the loading is done by hand. Two inclines are used: one with 24-in. gage track and ¾-cu. yd. cars, and the other with 36-in. gage track and 1½-cu. yd. cars. The cars are hauled up the incline one at a time by a 10 × 12-in. double-cylinder Lidgerwood hoisting engine, and teams handle them in the pit and on the spoil bank. Generally 35 men are worked in the pit and two men on the dump for each incline. The wages paid are $1.50 per day for ordinary laborers and $3 per day for foremen. A 16¼ × 16 × 36-in. Ingersoll-Sergeant compressor furnishes the air for running the drills.

Regulating Works.

The works for regulating the discharge of the main channel into the tailrace leading to the Desplaines River consist of a bear-trap dam and a series of sluice gates, as shown by Fig. 91. This illustration shows the general arrangement of the works so clearly that no further general description is needed, and attention may be turned to the details of construction.

Sluice Gate Construction.—Altogether there will be 15 sluice gates, resembling in a general way the well-known Stony gate. These gates will work up and down between masonry piers, and

altogether furnish 15 clear openings 30 ft. wide for the flow of water. In the beginning, however, only seven of these openings will be used, and therefore only seven gates will be constructed, but all of the piers will be built at once. At each end of the series of gates there is a suitable masonry abutment, and a roadway coming down the canal bank will be carried over the gates by a series of spans extending from pier to pier.

Fig. 94 shows the design and construction of the masonry piers in detail. Each consists of bearing sills, gate guides and supports and bearings for the shafts and gearing, by means of which the gates are raised and lowered. In another article full details of the operating machinery will be given, but here the description will be confined to the metal attached to the piers. The bearing sill is of oak, fastened to the foundation with 12 1½-in. steel holding-down bolts, and capped with a bearing rail on which the bottom edge of the gate rests. The hydraulic jack pedestals shown at the bottom are for the purpose of getting a lift on the gate in case the usual lifting mechanism is not powerful enough to raise them, owing to wedging, freezing or similar accidents. The jacks will be used in case of emergency only. The relative location of the so-called side and end elevations of the gate guides is made clear by a study of Fig. 94 in connection with the plan of Fig. 95. These guides are constructed of mild steel and cast iron. All joints between the ironwork and the masonry are compactly filled with Portland cement mortar. It will be noted that a set of leveling screws are provided for adjusting and leveling the guides in construction. The construction of the counterweight boxes is sufficiently explained by the drawings. It will be seen that the weight of the counterbalance is made adjustable by the use of cast iron weights of small size.

The gates are constructed of mild steel, as shown by the elevations and sections in Fig. 96. The drawings are in such detail that no further description is necessary, except perhaps to state that at each end of the gate there will be an anti-friction device inserted in the jaw of the steel casting. The construction of this anti-friction device will be fully described in another article.

The specifications for material to be used in the masonry and metalwork just described are in brief as follows:

Masonry.—The best Portland and natural cements shall be used. The development of tensile strength for Portland cement shall be 400 lbs. per sq. in., after having set seven days, and for natural cement 100 lbs. per sq. in. after having set seven days. All lumpy, dirty or damaged cement shall be rejected; also damaged and short-weight packages. All sand is to be clean, sharp and free from loam or pebbles.

Portland cement mortar shall consist of one part, by volume of the specified Portland cement to two parts of the specified sand. Natural cement mortar shall consist of one part by volume of the specified natural cement to one part of the specified sand.

The Portland cement concrete shall consist of two parts, by volume, of broken stone to one part, by volume, of the specified Portland cement mortar. The stone and mortar shall be thoroughly incorporated, so as to make a homogeneous mass. In the foundations the concrete shall be laid in courses not exceeding 4 ins. in thickness. The natural cement concrete shall consist of two parts, by volume, of broken stone to one part, by volume, of the specified natural cement mortar.

Metalwork.—No specific process of manufacture will be demanded, provided the material fulfills the requirements of these specifications. The tensile strength, limit of elasticity and ductility, shall be determined from a standard test piece of as near ½ sq. in. sectional area as possible. The elongation shall be measured on an original length of 8 ins. Iron of all grades shall

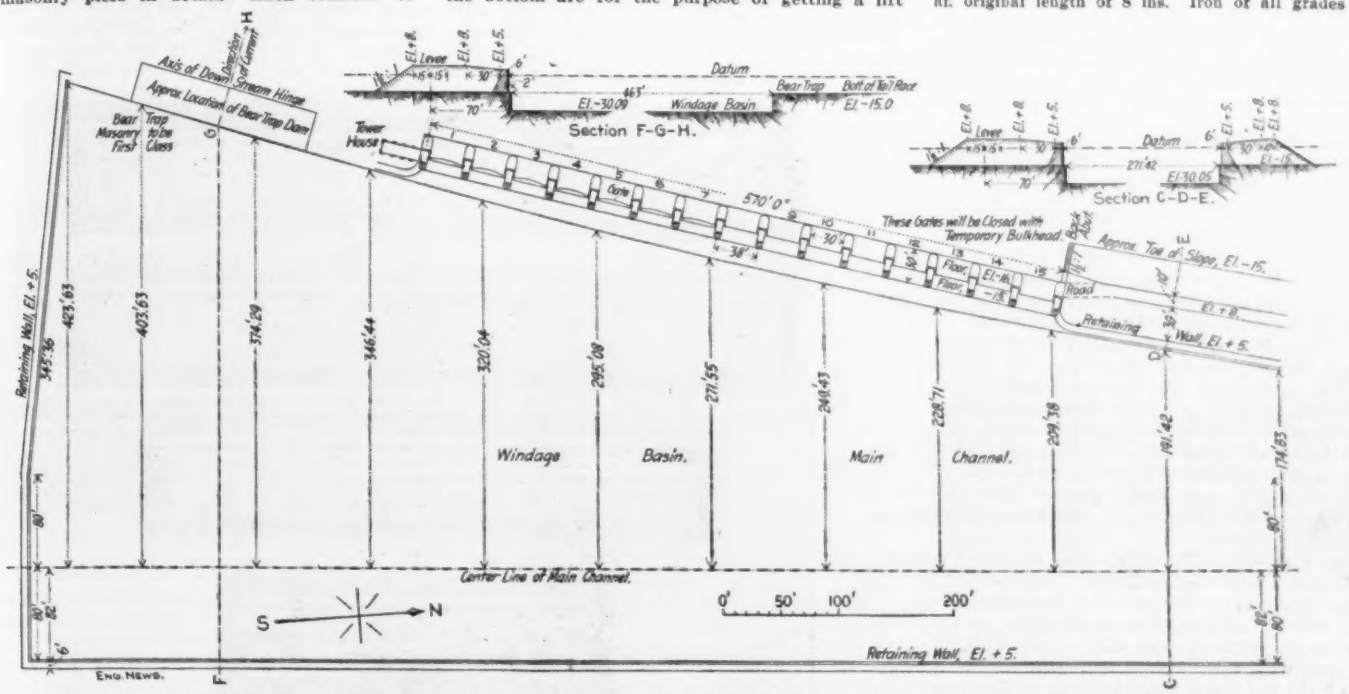


FIG. 91. PLAN OF SOUTH END OF SECTION 5, SHOWING WINDAGE BASIN AND LOCATION OF REGULATING WORKS.

what, for want of better terms, may be called a body and a tower, and is founded on a concrete footing on solid rock. The body is constructed of dimension-stone facing, backed with Portland cement concrete, and the specifications require that each course of facing shall be laid complete and the backing brought up to its top level before the next course is laid. The same method of construction is required for the towers, which are to

Fig. 92. View of Section 15, showing Steam Shovel Handling Blasted Rock.

have a hard-burned, sewer-brick facing and a natural cement concrete backing. Capstones cover the top of the tower and also the exposed top surfaces of the body. Between the piers are floors of granite block paving laid in Portland cement concrete, and the necessary bearing sills for the gates. Details of the bridge between piers, the fixed shaft supports at the tops of the towers, the snubbing posts and other minor constructions are shown by the illustration.

Fig. 95 shows details of the counterweight and the metal attached to the piers. This comprises

have an elastic limit of not less than 26,000 lbs. per sq. in.

Material.	Ult. strength, lbs. per sq. in.	Elong. in 8 ins., %.	Red. area at fract., %.
Iron:			
High-test or tension	50,000	18	..
Angle and shape iron	48,000	15	..
Plates 8 to 24 ins.	48,000	15	..
" 24 " 36 "	46,000	10	..
" over 36 "	.....	8	..
Rivet iron	50,000	18	..
Pin iron	50,000	15	..
Steel:			
Mild steel	60,000	25	45
Rivet "	60,000	25	50
Pin "	60,000	20	40

Specimens taken from bars of a larger cross-section than 4½ sq. ins. will be allowed a reduction of 500 lbs. for each additional square inch of section, down to a minimum of 48,000 lbs., and have an elongation of 15% in 8 ins. All iron for tension members must bend cold through 90° to a curve whose diameter is not over twice the thickness of the piece without cracking. At least one sample in three must bend through 180° to this curve without cracking. When nicked on one side and bent by a blow from a sledge the fracture must be mostly fibrous.

Specimens from angle and other shaped iron must bend cold through 90° to a curve whose diameter is not over twice the thickness of the piece without cracking. Samples of plate iron shall stand bending cold through 90° to a curve whose diameter is not over three times its thickness without cracking. When nicked and bent cold, the fracture must be mostly fibrous. Full-size pieces of flat, round or square iron not over 4½ ins. in sectional area shall have an ultimate strength of 50,000 lbs. per sq. in., and stretch 12½% in the body of the bar. Bars of a larger sectional area than 4½ sq. ins. will be allowed a reduction of 1,000 lbs. per sq. in. down to a minimum of 46,000 lbs. per sq. in. and stretch 10% in the body of the bar. In all cases the amount of phosphorus contained in steel shall not exceed 0.1%. Specimens of mild steel from finished material for test, cut to size specified above, shall have an ultimate strength of 60,000 lbs. per sq. in.; a deviation of 4,000 more or less than 60,000 will be allowed; minimum elastic limit, one-half the ultimate strength; minimum elongation, 25% in 8 ins.; minimum reduction of area at fracture, 45%.

Before or after heating to a cherry red and quenching in water at 82° F. this steel shall bend 180° to a diameter equal to thickness of the piece tested, without

sign of fracture. Any rivet hole for ¾-in. rivet, punched as in ordinary practice (with center not more than 1¼ ins. from edge of piece) shall stand drifting to a diameter 25% greater than the original hole, without cracking, either in the periphery of the hole or in the extreme edges of the piece, whether they be sheared or rolled. Rivets shall bend cold 180°, with sides to close contact without sign of fracture, and shall stand the quenching test at a bright yellow heat.

All steel castings shall have the properties and meet the requirements given in what follows, unless otherwise specified. The amount of phosphorus contained shall not exceed 0.1%; the ultimate strength shall not be less than 60,000 lbs. per sq. in.; minimum elastic limit, 25,000 lbs.; minimum elongation, 15%. All steel castings shall be sound and free from injurious roughness, sponginess, pitting, shrinkage cracks or other cracks, cavities, etc., and shall be thoroughly annealed according to good practice.

When not otherwise specified, all iron castings shall be tough gray iron, sound and free from injurious cold shuts ad blowholes, true to pattern and of workmanlike finish. Sample pieces 1 in. square cast from the same heat of metal in sand molds shall be capable of sustaining on a clear span of 4½ ft. a central load of 500 lbs. when tested in the rough bar.

The specifications for workmanship do not differ materially from those for ordinary first-class work of this character. It is required that all metal before leaving the shop shall be thoroughly cleaned and be given one coat of pure linseed oil; that all surfaces in contact shall receive one heavy coat of approved paint before assembling, and that all finished surfaces shall be coated with white lead and tallow before leaving the shop. After erection all iron and steelwork are required to be thoroughly and evenly painted with two coats of paint of a quality and color approved by the Chief Engineer.

Tower House.—At the south end of the series of sluice gates a tower house for the storage of tools and the shelter of the operators is to be built. This house will be essentially a continuation of the south abutment tower, and will be built of brick and steel, with a steel plate roof designed for a load of 100 lbs per sq. ft. Leading to this roof at the south end of the house there will be a stairway, by which the operators can reach the bridge running along the top of the pier towers. From this bridge the gates will be operated, as will be described in another article.

THE SLIDE RULE AND HOW TO USE IT.

By G. D. Snyder, City Engineer, Williamsport, Pa.

Slide rules are now made with the graduations on celluloid facings, from which very fine readings can be taken, and instead of the old brass runner, they are now made with a runner that consists of a glass plate on which two fine lines are marked, from which mark finer settings can be obtained than before. Slide rules are frequently made with the beveled edge graduated in inches and sixteenths, but the engineer will find it much more convenient for many uses to have it divided in decimals of an inch.

In learning to use the slide rule one should undertake with it nearly every calculation that arises in his practice, checking the work at the same time with figures, and he will thus in a short time obtain a knowledge of its possibilities and limitations.

As the theory on which the slide rule is constructed is fully explained in the pamphlet that accompanies it, it need not be described here.

It is merely a mechanical means of adding and subtracting the logarithms of numbers without having recourse to a table.

General Principles.

Fig. 1 shows the slide rule as usually constructed. There are two scales on the rule and two on the slide; these will be referred to as A, B, C and D, as marked in Fig. 2.

Multiplication.—To multiply, set the index of the slide opposite the multiplicand on the rule; the result will then be found on the rule under the multiplier on the slide.

Example: Multiply 2 by 3.

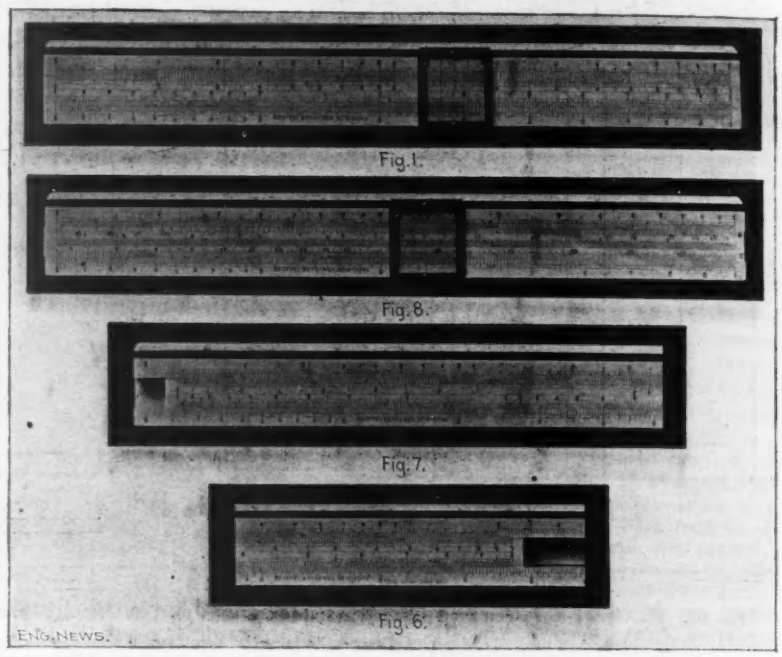
Using scales A and B, set the left index of B under 2 on A, then over 3 on B will be found 6 on A (see Fig. 3), and all the other numbers on B will be found to be in the same proportion with those on A. Thus, 4 will be found under 8, 6 under 12, 7 under 14, etc., or, considered as a proportion, $1 : 2 :: 3 : 6 :: 4 : 8 :: 6 : 12$, etc., or $\frac{1}{2} = \frac{3}{6} = \frac{4}{8} = \frac{6}{12}$, etc. These results will be proportionally the same whatever value we assign to the numbers, which can be considered as 200, 600, 800, etc., as 20, 60, 80, etc., or as .2, .6, .8, etc.

Rules for the position of the decimal-point are given in the pamphlet that accompanies the rule, but usually its position can be obtained by inspection.

The above multiplication can be performed on the lower scales where finer readings can be obtained. If the left-hand index of C is set over 2 on D, it will be found that numbers above 5 on the slide protrude beyond the rule. To obtain these results the right-hand index of C must be set over 2 on D, as shown in Fig. 4, when 12 will be found under 6, 14 under 7, 16 under 8, etc.

Division.—The process of division is merely the reverse of multiplication. The divisor is set opposite the dividend, and opposite the index is found the quotient.

Example: Divide 20 by 8.



Using the lower scales, set 8 over 20; under the index will be found 2.5 (see Fig. 5).

Percentage.—One of the most advantageous uses to which a slide rule can be put is in computing the percentages that the different items of the cost of a structure form of the whole. This can best be illustrated by examples.

The total cost of a bridge was $12,300, the labor amounted to $7,640; what percentage is this of the whole? Set 12,300 on C over 7,640, on D, under the index C will be found on D 62.2, the percentage required.

The cost of a mile of railway is made up of the following items: Track, $8,000; grading, $7,500; right of way, $2,000; miscellaneous, $4,500; total, $22,000. What percentage does each item form of the whole?

This can be obtained with one setting. Set the right index of B under 22,000 (the total cost); then under 8,000 on A will be found 36.3% on B

"	7,500	"	"	"	34.1% "
"	2,000	"	"	"	9.1% "
"	4,500	"	"	"	20.5% "
Total,	22,000				100.0% (see Fig. 6.)

The peculiar value of the slide rule is in problems like the above, where the percentages of all the items can be obtained in one operation, while with any other method each would have to be figured separately. The position of the decimal point in problems like the above can usually be obtained by inspection. It will reduce liability to error if the larger numbers are taken first.

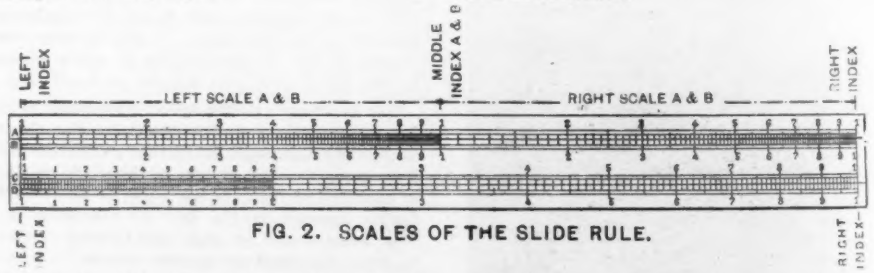


FIG. 2. SCALES OF THE SLIDE RULE.

Squares and Square Roots.

On scales A and B there are in the length of the rule two complete sets of numbers, while there is only one set of numbers on scales C and D, the numbers on the lower scales taking up twice the distance they do on the upper. To square a number its logarithm must be multiplied by 2, and to obtain its square root its logarithm must be divided by 2, and as the distances on the rule represent logarithms of the numbers affixed to it, the numbers on the upper scales are the squares of those on the lower.

To square a number, set the runner to the number on the lower scale, and the coinciding number on the upper scales will be its square. Thus, over 2 will be found 4; over 5 will be found 25; over 15 will be found 225, etc.

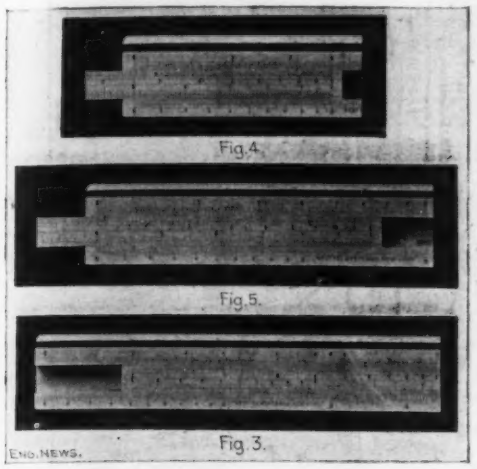
To obtain the square root the above operation is reversed by setting the runner to the number on the upper scale, the coinciding number on the lower scales will be the square root. Thus, under 9 will be found 3, under 16 will be 4, under 625 will be 25, etc. As there are two sets of figures on the upper scale, care must be taken that the proper one is used; thus, in obtaining the square root of 9, the 9 on the left scale must be used, for if the runner is set to the 9 on the right-hand scale, its coincident number will be found to be 9.48 +, which is the square root of 90.

If the number whose square root is to be taken

has an odd number of figures in it, counting the figures in front of the decimal point, use the left-hand scale, if an even number, use the right-hand scale. Thus, with 625 use the left-hand scale; with 62.5 use the right-hand. If the number is all decimal, use the right-hand scale, if there are no ciphers next the demical point, or if there are an even number of ciphers next the decimal point; with an odd number of ciphers next the decimal point, use the left-hand scale.

Cubes and Cube Roots.

To cube a number, set the index over the number on D. Over the same number on B will be found its cube on A. Thus, to cube 4, set the index



to 4 on D; over 4 on B will be found 64 on A. Cube roots are obtained by reversing the above process. They can be obtained by two different settings: (1) Move the slide until the number on B under the given number of A is the same as the number on D, under the index of C. This is the cube root sought. Example: What is the cube root of 7? Move the slide from the left to the right until the number on B under 7 on A is the same as the number on D under the index of C. In this case it will be found to be 1.913. (2) Invert the slide and set the index of C under the given number on A; then look for two coincident numbers on scales B and D, which will be the cube root sought. What is the cube root of 125? Set the left index under 125 on the left portion of scale A; then, looking along scales B and D, 5 will be found to coincide on the two scales, and is the root sought (see Fig. 7).

Care must be taken that the right number is taken off scales B and D in obtaining cube roots, for there are three different numbers that will fill the above requirements. For instance, with the rule set as before, in addition to 5 coinciding on scales B and D, 2.32 will be found to do the same, and is the cube root of 12.5. Also, if the right index is

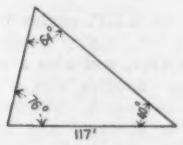


Fig.9.

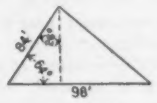


Fig.10.

set under 125, 10.77 will be found to coincide, as it is the cube root of 1,250. Usually the proper root can be found by inspection.

The Solution of Plane Triangles.

The under side of the slide is graduated to a scale of sines and a scale of tangents, so that trigonometric calculations can be made on the rule. When the under side of the slide is uppermost, the scale of sines will be along scale A and the scale of tangents along scale D (see Fig. 8). By referring to a table of natural sines, it will be found that 1.000 is the sine of 90°; that .100 is the sine of 5° 44′, and that .010 is the sine of about 0° 34½′, so the right index of the scale is 90°, the middle index is 5° 44′ and the left index is 0° 34½′. Sines of less than 0° 34½′ can be found by setting 34½ on B under the right index of A; then over any number of minutes on B will be found the corresponding natural sine on A. Note the graduations on the scale of sines; as rules are usually graduated, every degree is marked between 40° and 70°. Above 70° the shorter marks are every 2° until the first long mark is reached, which is 80°. There is only one mark (85°) between 80° and the index.

By referring to a table of natural tangents, 1.00 will be found to be the tangent of 45° and .100 to be the tangent of 5° 43′, so the right index of the scale of tangents is 45°, and the left index is 5° 43′. To obtain tangents less than 5° 43′, set 5° 43′ = 5.72 on C, over the right index of D; then under the angles expressed in degrees and decimals on C will be found their corresponding natural tangents on D. With the slide set as above, the tangent of 1° will be found to be .01745. To find the tangent of angles less than 1°, set 60 opposite 1745 and minutes on the slide will be opposite their corresponding tangents on the rule. Tangents of angles greater than 45° can be obtained by dividing 1 by the tangent of the complement of the angle.

Triangles can be solved very readily on the slide rule and with considerable accuracy if not more than three or four figures are necessary in the results.

Example: What is the altitude and base of a right-angled triangle with a hypothenuse of 56.5 and an angle at the base of 65° 30′.

Set the right index of the scale of sines under 56.5; then over 65° 30′ will be found 51.4, the altitude, and over 24° 30′ (the complement of 65° 30′) will be found 23.4, the base. The great advantage of the slide rule in problems like the above is that both the required sides can be obtained with one setting.

The rule is: With one of the legs of a right-angled triangle given, set the angle opposite the given side under that side; then over the index will be found the hypothenuse, and over the complement of the first angle will be found the remaining leg; that is, each side is over its opposite angle. With the hypothenuse given, set the index under the hypothenuse and the legs will be found over their opposite angles. The above can be solved without reversing the slide, as most slide rules have an index on the under side of the rule on which sines can be read. The setting in the preceding example is as follows: Set 65° 30′ on scale of sines, to index on under side of rule, then under 56.5 on A will be found 51.4 on B; move 24° 30′ to index, under 56.5 will be found 23.4 as before.

Example: What is the altitude of a right-angled triangle, with an angle at the base of 0° 25′ and a hypothenuse of 1,240? Here the angle is smaller than can be read on the scale of sines. On the scale of sines will be found a mark for single minutes near the 2° mark. Set this mark to the under index of the rule, then minutes can be read along B and their corresponding sines will be found on A.

As noted before, 34½′ is about as low as can be read on the scale of sines. With the slide set as above, 34½′ will nearly coincide with the index, and 1′ will be found under .000291, which is its sine. Set the runner to 25′ on B and move index to runner; over 1240 will be found 9.0. The position of the decimal point can be found by a mental calculation, thus: As noted before, the indexes of scale A correspond with 0° 34½′, 5° 44′ and 90°, respectively; if the angle had been 90°, the altitude would have been 1240; if it had been 5° 44′, the altitude would have been 124.0; if it had been 0° 34½′, the altitude would have been 12.40; the angle is 0° 25|, therefore, the result must be less than 12.40.

Example: Given a right-angled triangle with a base of 21 ft., and altitude of 28 ft. and a hypothenuse of 35 ft., what are the angles? Set the right index of the scale of sines under 35; under 28 will be found 53° 10′, the angle at the base, and under 21 will be found 36° 50′, the angle at the altitude. In a problem that can be solved by using the scale of tangents a finer reading can be obtained for the larger angles than by using the scale of sines.

Example: Given a right-angled triangle with a base 64 and an angle at the base of 42° 31′, what is the altitude? Set index over 64. Under 42° 30′ on the scale of tangents will be found 58.6.

Example: What is the altitude of a triangle with a base of 24.5 and an angle at the base of 72° 15′?

Here the angle is greater than 45°, and cannot be read on the scale of tangents, so the complement of the angle is used and divided into the base instead of multiplying. 90° — 72° 15′ = 17° 45′. Set 17° 45′ over 24.5; under index will be found 76.5, the altitude required.

Owing to the ease with which numbers can be squared on the slide rule, work can readily be checked by seeing if the square root of the sum of the squares of the two legs is equal to the hypothenuse. One of the simplest ways of avoiding mistakes is to bear in mind that sines and cosines are merely percentages of the hypothenuse, and that tangents and cotangents are percentages of the base or altitude.

The preceding examples have been applied to right-angled triangles only. The following are applied to plain triangles in general:

Example: Given one side and the angles of a triangle (see Fig. 9) to obtain the remaining sides.

Here we use the proposition: Sine of the angle opposite the given side : sine of the angle opposite the required side : : the given side : the required side.

To solve the above problem, set 64°, the given angle, on scale of sines, under 117, the given side on A; then over 76° will be found 126.3, the length of its opposite side, and over 40° will be found 83.7, the length of its opposite side.

With the three sides given and one of the angles the remaining angles can be found in the same way, and with two sides given and the angle opposite to one of them, the solution is equally simple.

Example: Given a triangle with a side of 81 ft. and a side of 60 ft., with an opposite angle of 40°. Required, the remaining side and the remaining angles.

Set 40° on scale of sines under 60 on scale A, then under 81 will be found 60°, being the opposite angle, and the remaining angle will be 180° — (60° + 40°) = 80°, over 80° will be found 92, the remaining side.

With two sides and the included angle given, the solution is effected as follows: Example.—Given a triangle with a side of 98 and one of 84, and an included angle of 64°. Find the remaining sides and angles. Here we use the proposition: The sum of the two sides : their difference : : the tangent of half the sum of the remaining angles : the tangent of half their difference. The sum of the two sides is 182, their difference is 14 and the half sum of the remaining angles is 58°. Set 182 on C over 14 on D; move the runner to the index, reverse the slide and bring index of scale of tangents to runner. Now, if the half sum of the remaining angles were less than 45° the tangent of half their difference would be found under the angle with the sides in the above position, but as the angle is greater than 45° the complement of the angle must be set to their runner, when their required tangent will be found under the index. The complement of 58° is 32°. Set 32° to runner; move runner to index; then move slide so that the indexes of the scale of tangents coincide with those of scale D. Then 7° will be found at the runner. Adding this to 58° gives 65°, the greater angle, and subtracting from 58° gives 51° the lesser. Then set 65° on scale of sines under 98; over 51° will then be found 84, and over 64° will be found 97.2, the remaining side.

This problem can be solved more readily by resolving the triangle into two right-angled triangles (see Fig. 10). The setting would be as follows: Set the index of the scale of sines under 84. Over 64° will be found 75.5, the altitude of the triangle, and over 26° will be found 36.8, the base of the one right-angled triangle. Subtracting 36.8 from 98 we obtain 61.2, the base of the other. Squaring this on the rule we obtain 3,745±, and squaring 75.5 the altitude, we obtain 5,700 ±. The sum of these two squares is 9,445±, the square root of which is 97.2, the remaining side as before. Then set 64° on scale of sines under 97.2, and the remaining angles will be found under their opposite sides as before. With three sides given the solution is effected as

follows: Assume the longest side as a base, then as the base is to the sum of the other sides, so is the difference of those sides to the difference of the segments of the base.

Example.—Given a triangle with sides of 146, 78 and 94, what are the angles? Here using scales C and D, set 146 over 172. Under 16 will be found 18.8, the difference of the segments of the base, One-half of 18.8 added to one-half of 146 gives 82.4, the longer segment of the base. Set the index of the scale of sines under 94. Under 82.4 will then be found 60° 20′, which, subtracted from 90°, gives 28° 40′, the angle opposite 78. Set 28° 40′ under 78, then under 94 will be found 35° 20′, its opposite angle, and under 146 will be found 64°, the external angle at the apex.

THE COLWELL FURNACE FOR LIGHT, INFLAMMABLE REFUSE, NEW YORK CITY.

When garbage and other city refuse is dumped at sea, some of the lightest of it floats ashore, littering and fouling the beach, and sometimes giving offense during the process of decomposition. The extent of this trouble depends upon the character of the wastes and the location of the dumping grounds, both as to the distance of the latter from shore and their relation to the prevailing winds. The city of Boston, in disposing of a portion of its refuse at sea, follows a chart which indicates the dumping place for each direction of the wind, a practice especially necessary because of the peculiar shore line in the vicinity of Boston. In the case of New York the principal advantage of one dumping ground over another would probably be its distance out to sea, and this is a rule which is almost universal in its application. Unfortunately, when the wind is strong ashore the dumping crew wish to unload and put about as soon as possible, instead of going farther out than usual. Altogether ocean disposal has many drawbacks, as well as advantages, and the question arises, What can be done to diminish the one and increase the other?

In attempting to solve this problem, Col. Geo. E. Waring, Jr., Commissioner of Street Cleaning for New York city, decided to try separate collection and disposal of waste paper, rags, excelsior and other light waste which had heretofore been dumped into the garbage cans. Some of this refuse has a small market value and the remainder is readily burned. To accomplish this, he made a temporary agreement with Mr. Herbert Tate, of 21 East 20th St., New York city, to collect this matter separately in that portion of the city below 59th St. As compensation for this work Mr. Tate has for his own benefit all the salable matter collected, with the exception of that from one street-cleaning district, mentioned just below. Mr. Tate also operates without further compensation the sorting plant and furnace for this same district, also described below. The privilege of sorting over the refuse of all kinds at the city dumps for garbage, street sweepings and other refuse brought the city some $90,000 a year even under Tammany rule, and all the paper, rags, and other marketable materials were then promiscuously mixed with the other refuse brought to the dumps.

The number of carts employed in this work is given by Mr. Tate as 68, mostly trucks, of which 10 serve the district bounded by 59th St., Sixth Ave., 22d St. and the North River, their collections going to 53d St. and Twelfth Ave., where all salable matter is sorted out and packed for sale, remaining the property of the city, and the balance is burned in a furnace designed and built by Mr. A. W. Colwell, consulting and contracting engineer, of 39 Cortland St., New York city. The furnace was put in operation about Sept. 10. The contract provided that the furnace should burn 60 loads of 300 lbs. each, or 18,000 lbs. in 10 hours. The loads brought to the furnace actually weigh more than 300 lbs. The furnace has 28 sq. ft. of grate surface, each square foot of which is said to burn at least 1 lb. per min.

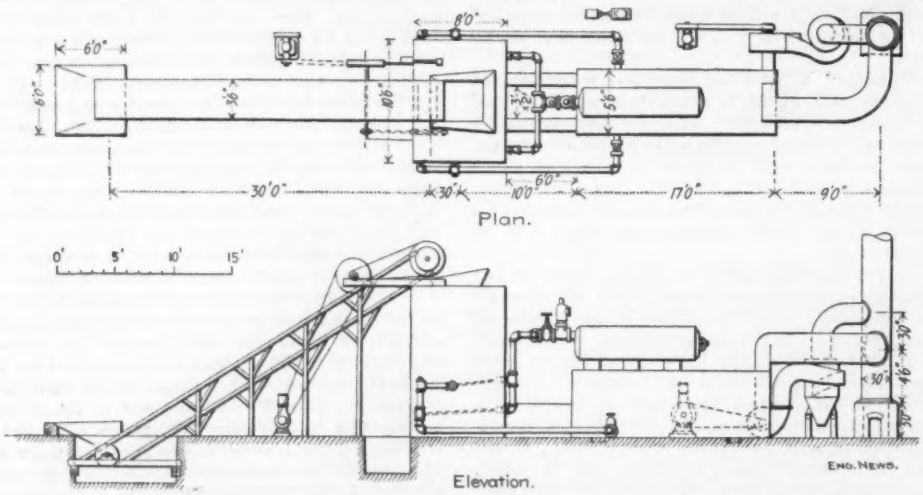


FIG. 1. PLAN AND ELEVATION OF COLWELL REFUSE SORTER AND BURNER, NEW YORK CITY.

The plan and elevation of the main part of the plant, including the elevator, furnace, boiler, engines and other appurtenances, are shown by Fig. 1. Fig. 2 is a sketch from a photograph showing the elevator in operation, with the sorting men standing beside it, ready to pick out such paper and rags as are worth saving.

A Jeffrey inclined elevator is used, made by the Jeffrey Manufacturing Co., of Columbus O. It is composed of wood slats 5 ins. wide, running on sprocket chains or belts. The carts dump their contents at the foot of the elevator, from which point the material is thrown onto the elevator with forks. Such material as is not picked off by the sorters goes to the furnace. Manila paper, all other kinds of paper and rags are each sorted separately and made into bales by means of two hand presses. There is a horizontal, hinged door in the top of the furnace, provided with a spring and designed to be self-acting—that is, when a given weight of refuse becomes heaped upon the door, the latter is supposed to fall down emptying the paper into the furnace, upon which the spring closes the door. In practice the door is generally operated by hand.

FIG. 2. VIEW OF ELEVATOR WITH SORTERS AT WORK.

The furnace has an upper and lower grate, the former being designed as a drier and carbonizer, and the latter for the principal part of the combustion. The walls of the furnace are hollow, and provision is made for drawing from their air spaces the most highly-heated portion of their air and letting it act upon the material to be consumed. The furnace is lined with firebrick. The flames and gases of combustion pass out through checkerwork at the base of the furnace, thus securing more perfect combustion, and then to and through the boiler to make steam. The boiler is of 100 HP., has 1,280 sq. ft. of heating surface, and is run at 60 lbs. pressure.

Steam is used to drive the 5-HP. engine which runs the elevator, the 7-HP. engine operating the exhauster and dust catcher, and also a small Worthington duplex pump. Besides this a considerable amount of steam is wasted. The smokestack is of steel, 30 ins. in diameter and 70 ft. high. The two engines were made by Orr & Sembower. The exhauster is a 45-in. Sturtevant planing mill exhauster, and the dust catcher was made by the Wisconsin Blow Pipe Co. The location of the exhauster and dust catcher is shown by Fig. 1.

The dust catcher is intended to obviate all difficulty from soot or other matter from the top of the smokestack, and judging from the pile of fine ashes or soot said to have been removed by the device, and the small volume and light color of the smoke at the top of the stack, it does its work well.

The plant is run about 10 hours a day. No fuel is purchased. Boxes or barrels saved from the previous day are used to start the fire each morning, after which the wastes conveyed to the furnace are the only fuel required.

Mr. Tate states that the ordinary paper recovered at the plant is worth about 30 cts. per 100 lbs.,

and the manila paper and rags about 45 cts. As already stated, these are the property of the city. Many bottles and a considerable amount of waste metal, mostly tin and sheet iron, come to the plant. The bottles have a market value, and the old metal can be treated for the solder, or it may be melted down for window weights.

The force employed at the sorting and burning plant is given by Mr. Tate as follows: One engineer at $2 a day; eight laborers at $1.25 a day, including one night watchman. The amount of water consumed is given as about 3,100 lbs. an hour. A rental of $60 a month is paid for a piece of land 50 × 100 ft. in area.

We are indebted to Mr. Tate and Mr. Colwell for the information given above, the material for the illustrations having been furnished by Mr. Colwell.

Since the above was put in type Mr. Colwell has sent us the following in regard to the value of combustible refuse as a steam producer, which we add as the expression of one who has given the matter attention in connection with the development of a furnace for burning garbage and refuse:

At present we are wasting quite 100 HP. during the 10 hours per day, because there are no manufacturing concerns nearby that will buy it. If the crematory, which is strictly innocuous, could be erected in a manufacturing district where parties could use the steam, it would yield a very respectable revenue—say, from $30 to $70 per horse-power per year.

This particular furnace at 52d St. was not erected with a view of destroying vegetable and animal matter as received from kitchens of private families, hotels or club houses, but notwithstanding that, we do receive a large amount of wet vegetable matter, which we consume perfectly without smoke or smell.

Our furnace can be built so that any amount of garbage can be burned by means of the combustible refuse, such as we are using, or, with the addition of ashes from private houses, which contain at least 25% of available fuel.

The idea of separation would be very good in some respects, but private families are having sufficient difficulty with servants not to aggravate the case by having three refuse receptacles, the garbage one to be cleaned and scrubbed out every time it is emptied by the public collector. It would make a household mutiny, and would be difficult to carry out this law.

NEW PUBLICATION RULES OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS.

The method of publication adopted by the American Society of Civil Engineers has always been more or less unsatisfactory, although several minor changes have been made from time to time, the latest of which was the issue of a monthly bulletin giving announcements, advance abstracts of papers, and general information. A radical change in the present system was adopted at the November meeting of the Board of Direction, to take effect Jan. 1, 1896. The bulletin will be discontinued, and the method of publication will be as follows:

Ten numbers of "Proceedings" will be issued during the year, being issued on the fourth Wednesday of each month, except June and July. Each number will contain the minutes of the meetings of the month of issue (except that the number for August will contain the minutes of the first meeting in June, and also of the annual convention). The "Proceedings" will also contain the other matter now printed in "Proceedings" and "Bulletin," except the abstracts of papers.

Each number of "Proceedings" will contain in full, but without discussion (and in most cases without plates), the papers to be read and discussed at the second meeting of the following month, and the first meeting of the second month thereafter. Under this arrangement an advance copy of every paper will be in the hands of members at least three weeks before its presentation for discussion. The May number will contain the papers to be presented at the convention, and possibly at the first September meeting.

The monthly issue of "Transactions" will be discontinued, and the papers, with complete discussions, both oral and by correspondence, will be issued from time to time in volumes of about 600 pages. These volumes will be sent in paper covers, but arrangements will be made for furnishing bound volumes to members or subscribers who desire them in that form, and are willing to pay the small extra cost.

Under this arrangement, and with the present amount of "Transactions," the Society will continue to issue 12 publication yearly, of which 10 will be "Proceedings" and two will be volumes of "Transactions."

Under this new system each member will receive an advance copy of each paper (instead of the present abstracts, or advance copies only by request) in full, in sufficient time for careful perusal and the preparation of oral or written discussion before the meeting at which the paper is to be considered. It will, therefore, be necessary for the author of the paper to present at the meeting only in brief abstract, leaving a much greater time available for discussion. The final publication will be deferred long enough for the revision and correction of all discussion, and each member will then receive sets of the papers in semi-annual volumes, with illustrations and discussions complete. One of the most important results of the change will be the abolition of the present absurd rule by which the technical press is forbidden to publish anything but the "abstract" given in "Bulletin" in advance of the publication of the paper itself by the Society. Technical papers of different classes want different sorts of information, even from the same Society paper, and do not care to be limited to certain abstracts or extracts, or to wait for several months before publishing a paper in full. Under the new system the technical press will be enabled to publish the papers (without the discussions) in whole or in part, much sooner than is now possible, which will doubtless be more satisfactory to the authors of papers.

A SEVERE TEST OF A MASONRY PIER.

We are indebted to Mr. George E. Mann, M. Am. Soc. C. E. and Chief Engineer of the Buffalo Grade Crossing Commission, for notes and the photograph here used in connection with a peculiar pier accident. This pier was one built for the viaduct over the New York Central Ry. tracks on

Michigan St., Buffalo, N. Y., described in our issue of Oct. 24. The stone used was Pennsylvania sandstone, and the masonry was laid with cement made by the Buffalo Cement Co. The weight of the pier was 40 tons. On Oct. 25, 60 days after the pier was completed, it was struck by a freight train backing down on a stub-switch. The pier was revolved bodily on the base-course, as shown in the illustration, without a crack in the masonry or cement joints above this course. Our informant does not state what happened to the car or train doing the damage, but as the stone shows no sign of fracture at the point of impact, the result was probably due to a steady push, rather than to a quick, sharp blow.

COLLISION ON THE CABLE RAILWAY ON THE BROOKLYN BRIDGE.

The most serious accident which has ever occurred on the Brooklyn Bridge cable railway was a rear collision soon after 7 a. m. on Nov. 19, during a heavy fog. Under the present method of operating, trains arriving at the Brooklyn end at this time of the morning stop on the curve where the old station was situated, and the switch engine which has just pushed out a train for New York to the point where the trains take the cable, comes over on a cross-over, backs on to the standing train from New York, and pulls it into the new Brooklyn station, which is just beyond the old one. All trains for Brooklyn release the cable on the down grade of the approach, and run by gravity to the station, and, except in the early morning, run round the curve at the bottom and into the new station. There is a signal at the end of the bridge structure, where the bridge joins the approach, and this is operated from a switch tower at the foot of the grade; and during fogs three men with lamps and flags are stationed between the tower and the signal.

The first of the two trains under consideration ran slowly down the grade beyond the signal, the conductor on the front car having been warned by a policeman on the roadway that the trains were running somewhat irregularly on account of the fog. This train stopped on the curve at the foot of the grade, close to the tower, waiting for the switch engine to back up and haul it on into the station. At the same time a flagman on the track at the switch tower started back with a red lamp to signal the following train. This next train, composed of four cars, was about 1,500 ft. behind the first train, the trains running at 1¾ minutes headway at that time of the day, and the speed being 10 miles per hour. Owing to the fog, the man at the tower could not tell that the first train had passed the signal until the train had reached the tower, and the signal was therefore left showing a clear track while the train was coming down the grade between the signal and the tower. During this interval the next train approached, and, finding a white light at the signal, the grips were released and the train ran at a good speed down the grade. The man who had gone back from the tower and the first fog man both showed red lights, but the fog was so dense that the conductor on the front of the train did not see them until he was close upon them, when he applied the vacuum-brake and rang the bell for the other men to apply the brakes on their respective cars (the brake not being operated continuously as yet, although the cars are fitted with hose connections). The space interval was too short, however, to enable the train to be stopped, and it struck the standing train with considerable force, the platform of the front car of the running train climbing upon and sliding over the platform of the rear car of the standing train. This latter train was nearly empty, but the rear conductor and a passenger were standing on the rear platform. The door was open, but they had not time to jump inside the car, and were caught in the wreck. The conductor had both legs cut off by the platform, and was thrown back into the middle of the car, while the passenger had one foot crushed and was pinned against the end of the car. Both men died soon after being removed from the wreck, and it is noted that this is the first case of a passenger having been killed in a train accident on the bridge, although about 400,000,000 passengers have been carried during the 12½ years since its opening.

Two precautionary measures will now be taken to prevent the recurrence of such an accident. In the first place, an electric track connection will be placed about a train length in advance of the signal above referred to, so that as soon as the rear of a train has passed that signal a bell will be rung in the tower, and the towerman will at once throw the signal to danger. In the second place, while trains are stopped outside the station, more switch engines will be kept in service, so that there will always be an engine ready to take on the train, instead of the train having to wait for the engine which has pushed out an outgoing train. It may be noted that the cable does not extend into either the Brooklyn or the New York station, the trains being hauled out at the rear of the station from the arrival platform, and pushed back to the departure platform and then pushed on farther to the point where the cable is picked up. This switching is now done by steam locomotives, but electric traction is to be experimented with for this purpose.

The Hamburg-American Steamship Line has contracted with British shipbuilders for six new steamers of 7,000 tons dead weight capacity each, for a total sum of $1,800,000, or about $300,000 each. These are apparently freight steamers, and the price named probably covers the hull construction only, without fittings. The boats are to be put into service between Hamburg and Boston, Philadelphia, and Baltimore.

ENGINEERING NEWS
AND
AMERICAN RAILWAY JOURNAL.

Published every Thursday at Tribune Building, New York.
Entered at the Post Office, New York, as Second Class Matter

D. McN. STAUFFER, CHARLES WHITING BAKER.....EDITORS.
WM. KENT, E. E. R. TRATMAN, M. N. BAKER, } ASSOCIATE
CHAS. S. HILL, A. B. GILBERT..... } EDITORS.
CHAS. W. REINHARDT..... CHIEF DRAFTSMAN.

GEO. H. FROST, F. P. BURT.....BUSINESS MANAGERS.
ALFRED E KORNFELD, New York..... } ADVERTISING
F. A. PECKHAM Chicago..... } REPRESENTATIVES

PUBLICATION OFFICE.....Tribune Building, New York.
CHICAGO OFFICE.....1636 The Monadnock.
LONDON AGENCIES: KEGAN PAUL, TRENCH, TRUBNER & Co. (Limited), Paternoster House, Charing Cross Road; SAMPSON LOW, MARSTON & Co. (Limited), St. Dunstan's House, Fetter Lane.

SUBSCRIPTION RATES: United States, Canada and Mexico, One Year, $5.00: 6 months, $2.50: 3 months, $1.00: single copies, 15 cents. To all other countries in the Postal Union, add $2.08 per annum (4 cents per number) to above prices for postage. No club rates allowed. Mailing addresses may be changed at will by sending both old and new address. We shall be obliged if subscribers who fail to receive their papers promptly will notify us without delay. The date when the subscription expires is on the address label on each paper: the change of this to a subsequent date is the only receipt sent, unless by special request.

ADVERTISING RATES: 20 cents per line agate measure. Want notices, special rates, see page 20. Rates for standing advertisements sent on request. Changes of standing advertisements must be in hand on Monday afternoon: new advertisements, Tuesday afternoon; transient advertisements by Wednesday noon.

The importance of safe steam piping in central stations of electric light and power plants is again illustrated by the accident last week in a Brush arc light station in New York city. The bursting of an 8-in. cast iron elbow ruined $3,000 worth of belting and put the station out of service for 24 hours. Fortunately the station attendants escaped with their lives. The steam piping of a large central station has come to be one of its most important features, owing to the practice of connecting up boilers and engines in such a manner as to permit any part of the plant to be cut out, and the attempt to provide duplicate pipe systems to a greater or less extent. It is worth considering whether better results might not be secured by striving to simplify the pipe systems so far as possible, and instead of duplicating piping, putting sufficient additional expense into the single line of piping to make it absolutely safe. In many cases it is likely that the expenditure of more intelligence in the design of the piping and greater efforts to secure good drainage, and avoid strains due to expansion and contraction, would result in great improvement It should be understood by the builders of such stations that the design of the steam piping is too important a matter to be left in the sole charge of an ordinary steam-fitter.

We discussed in our issue of Nov. 7 the rapid growth of modern cities and the necessity for providing abundant speedy and convenient means for transporting the population betwen the centers of business and the rapidly-widening zone of homes; and we noted especially the tendency toward the building up of suburbs in recent years. As cities become crowded and land becomes more valuable for business purposes, the people are constantly seeking cheaper homes, better air and generally more healthy surroundings, and they must go towards the circumference of the circle for these improved conditions. It is interesting in this connection to note the wise general recognition of this law in modern German cities, as described in Dr. Shaw's recent work upon "Municipal Government in Continental Europe." In every German town of any importance the layout of the streets is being adjusted to facilitate this movement towards the suburbs. The general plan adopted in laying out streets is a combination of the radial and concentric with the rectangular and parallel, the chief end in view being the creation of a system of broad and direct roads, diverging from centers of business to the outer region of homes; also, instead of permitting suburban regions to grow up at the individual will of land-owners and speculators, regardless of future conditions and possibilities, as has been, and still is, the rule in most American cities, the Germans control the expansion of the city by annexing the suburban territory while it is thinly settled and laying out the streets so as to harmonize with the general plan of the city. The neglect of similar foresight in the early history of American cities is now sadly interfering with their proper extension. Philadelphia, with its checkerboard layout of streets is a case directly in point. Attempts have been made within late years to overcome the existing disadvantages in local traffic in Philadelphia and other places by cutting out diagonal streets, but the cost of such an improvement at this date and a seeming lack of appreciation of the gain by those in authority have prevented any decided action in that direction. Another point in German practice universally recognized is that good street paving is essential, at any cost, to the growth and prosperity of the city; and the converse condition is also true that cheap and bad pavement is a luxury that no modern city can afford.

Broad, well-paved and clean streets are the arteries of a city, and are quite as important in their functions as similar channels in the human organization. To do their full duty, they must be placed where they are most wanted, and while the cost of remodeling our general plan of American street construction would be enormous in many cases, it should be done wherever this cost is not prohibitory. But the advice as to general plan chiefly applies to the extension of our towns and cities now so rapidly taking place, and to the control of this extension on broad and well-considered plans, providing for and assisting the future growth. The weak point in our past and present practice in the management of civic affairs is the tendency to plan and legislate only for the immediate present, leaving coming generations to correct and to pay for our blunders. The consequences of similar action in our predecessors are familiar to every one who studies the budget of annual outlay in any American city, and it does not speak well for the wisdom and fitness of our average city councils to see them still engaged in equally unwise and unbusinesslike legislation. The true cause lies deep down in our system of selecting the men who rule our cities and are resposible for the action here condemned. They may represent the people, and they may be good citizens, but as a rule they do not appreciate the full intent and meaning of the duties imposed by their office, nor can they do so from their previous training and experience. The adoption of the German system of selecting from any part of the Empire only experts for the management of all affairs connected with the finance, engineering, general maintenance and business operations of a city, and keeping these experts in office as long as they are efficient, is too much to expect under our institutions; but it is an ideal method of conducting the business of a municipality, and, judging from its methods and results in Continental Europe, it makes us regret that it is impossible here. Less of politics and general unfitness for office, and more businesslike methods are what we need, and we can only hope that we may get them in time.

We frequently receive letters asking where simple and explicit instructions can be obtained for the use of the slide rule; and to meet these frequent demands, we present on another page of this issue a paper on this subject by Mr. Geo. D. Snyder, City Engineer of Williamsport, Pa., which gives such instructions so plainly as to meet the needs of any learner. There has been a very great increase in the use of the slide rule by engineers during the past few years, but there are still very many, we believe, who might with much profit acquire the habit of using this time-saving little instrument. To this class of our readers we especially commend Mr. Snyder's paper.

Several correspondents have lately asked why this journal has so little to say concerning the renewal of work upon the Panama ship canal, its progress and its prospects. The answer is that this journal has no faith in the present or future prospects of this enterprise. The work now going on at the Culebra cut simply means either that certain parties in Paris are striving to reawaken French enthusiasm in the canal for their own private gain, or that they mean to hold the concessions already obtained by a semblance of work, in the hope that something may "turn up." The adverse conditions of the want of capital, lack of sufficient surveys, well-devised plans for controlling the floods of the Chagres, and the tendency to slip marking the natural conformation of the Culebra cut, still remain unchanged, and, as near as we can learn, no efforts are being made to solve the problems presented by these conditions. Despite newspaper accounts to the contrary, much of the work already done has been undone by the Chagres floods in the years intervening since the abandonment of the work, and the plant on hand has suffered accordingly by years of exposure to tropical surroundings. We simply repeat that we have no faith in the genuineness of the present pretense of a renewal of work at Panama.

An even more striking example of the value of street railway franchises than the interesting results in Toronto, discussed editorially in our issue of Nov. 7, is presented by the recent sale of the Kingsbridge street railway franchise in the upper part of New York city. Under the general law relating to street railway companies in cities of the first class in New York state, all such corporations must pay into the municipal treasury 3 per cent. of their gross receipts the first year of operation, and 5 per cent. thereafter. These figures are the minimum compensation for such franchises, the maximum being determined by selling the franchise at public auction to the bidder who will offer the largest additional percentage of the gross receipts. The men behind the Third Ave. Street Railway, who are generally accredited as being of keen judgment in business matters, consider the Kingsbridge franchise of such value as to warrant offering for it a cash payment of $250,000, and 38½ per cent. of the gross receipts above the statutory minimum, or 41½ per cent. for the first year and 43½ per cent. thereafter, and at that price the franchise was knocked down to them. Such figures seem to indicate that the fare to be charged on this line is excessive, or else the company could not afford to turn practically half of it, taking into account the advance cash payment, over to the city treasury. Dividing the public in an imaginary way into those who will patronize this line and those who may be said to be entitled to revenue from the company for the use of the streets, it may be asked, whether the former should be called upon to pay 2½ cts. for a ride and 2½ cts. into the city treasury, because the vehicles upon which they ride make use of the city streets. A 3-ct. fare, with ½ ct., or 16⅔ per cent. of the gross receipts, paid to the city by the company, would give the company about the same revenue per passenger as it will now receive, and would net the city far more than most American municipalities receive from street railway companies. And this decrease in fare would doubtless mean a large increase in passengers, to the advantage of company, city and passengers alike.

If reductions in fare cannot be secured in any other way, it may become necessary for cities to take the matter of urban transit into their own hands, owning and operating the lines, or preferably owning and leasing them, as is becoming more and more common in Europe, and with most excellent results? But this would be a long step—too long a one for the immediate present in most cities. Until it can be taken, or if undesirable as a permanent plan, we may hope that the lessons of Toronto's and of the sale of the Kingsbridge and other franchises in New York city may be learned and appreciated by other American cities. To some extent the principles here involved have already been put in practice in other cities of this country, but it is still true that our city authorities part

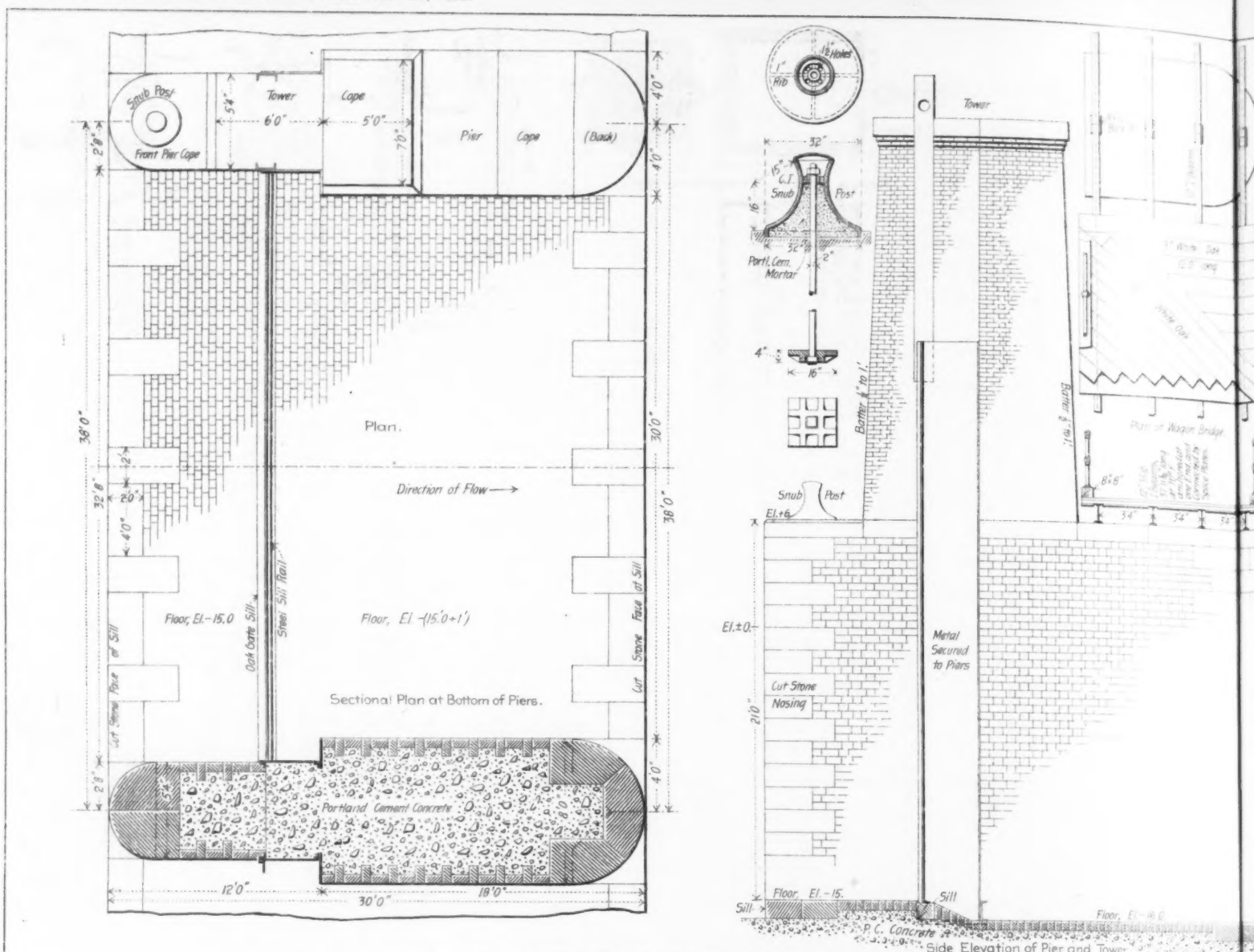


FIG. 94. PLAN AND ELEVATIONS OF MASONRY PIERS FOR SLUICE GATES.

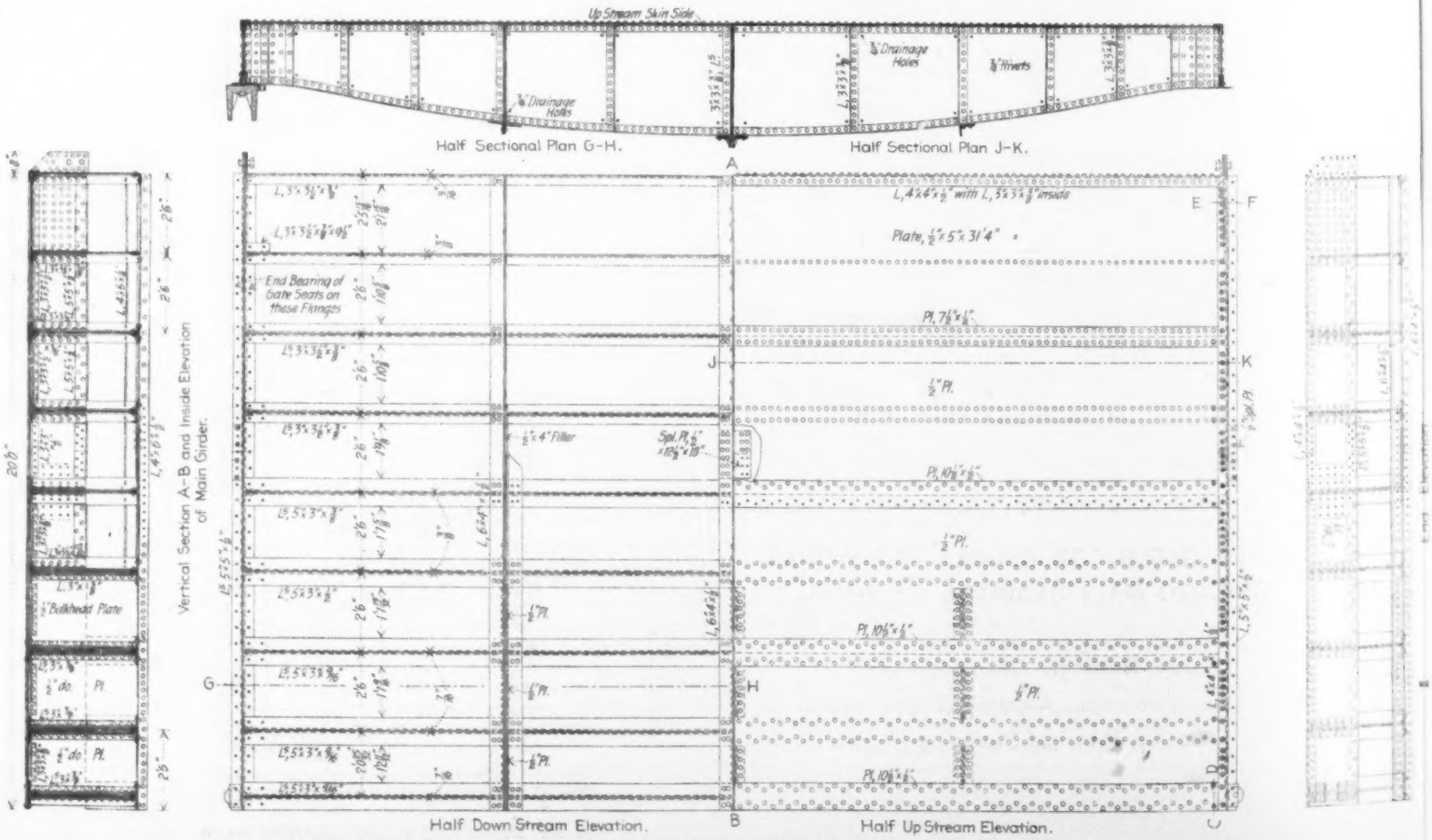
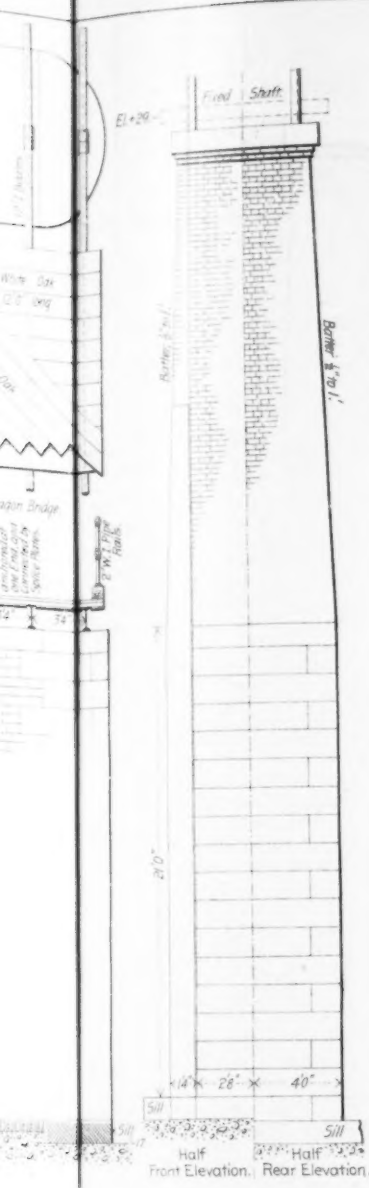
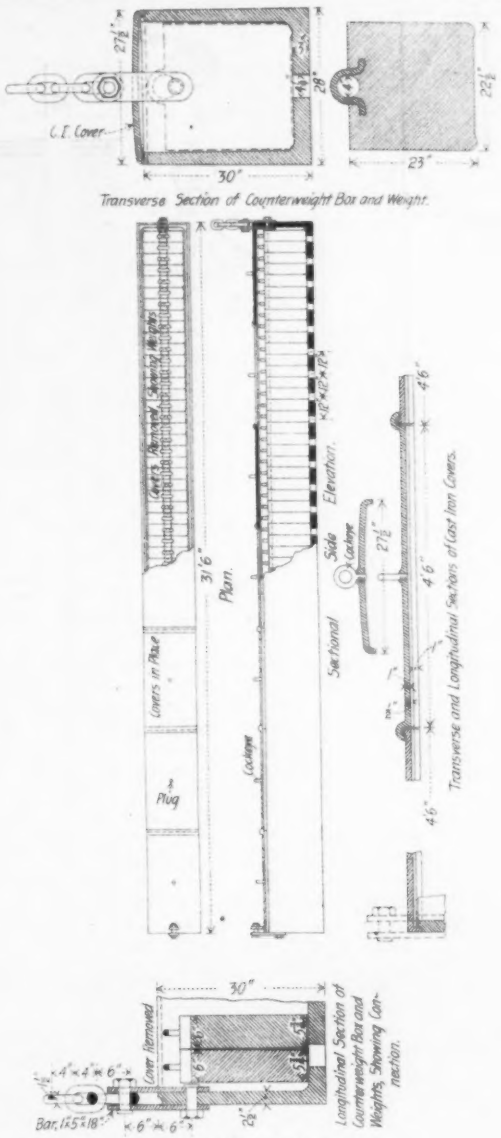
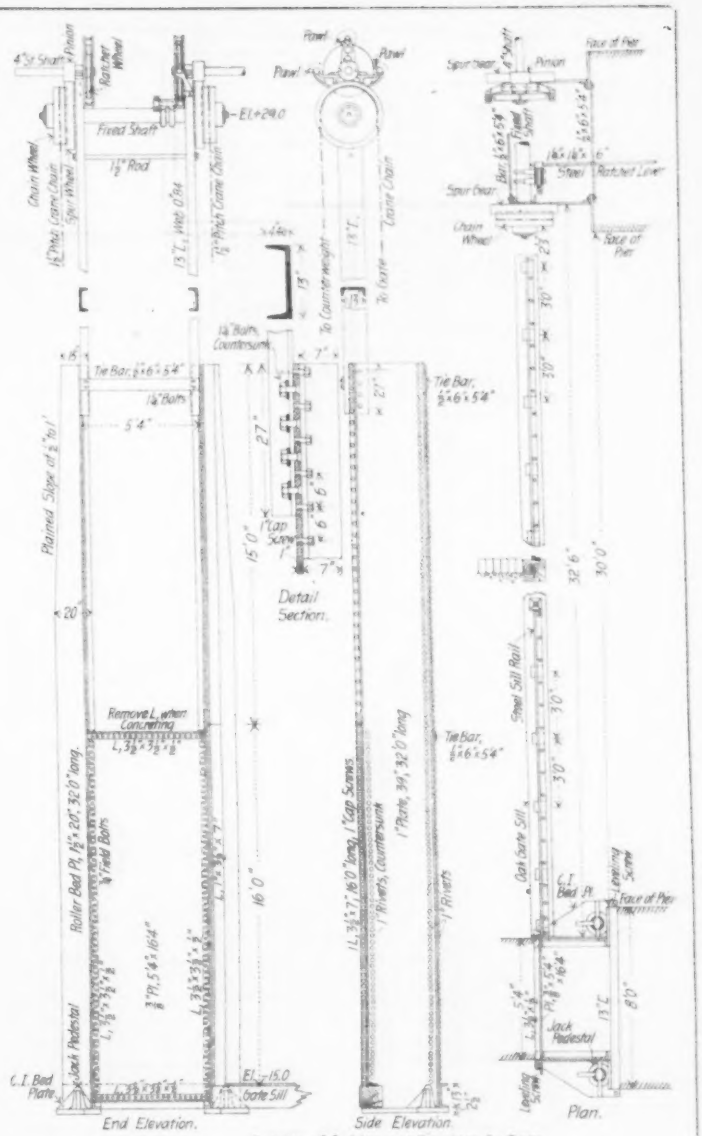
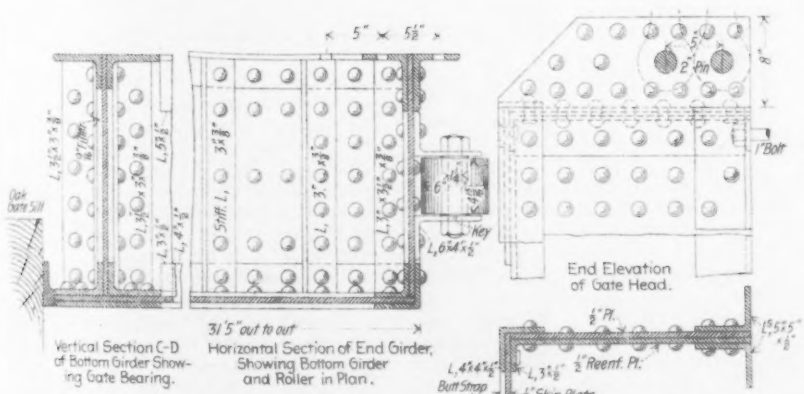

Up Stream Skin Side
Drainage Holes
Rivets
Half Sectional Plan G-H.
Half Sectional Plan J-K.
Vertical Section A-B and Inside Elevation of Main Girder.
End Bearing of Gate Seats on these Flanges
Plate, ½"×5"×31'4"
Half Down Stream Elevation.
Half Up Stream Elevation.

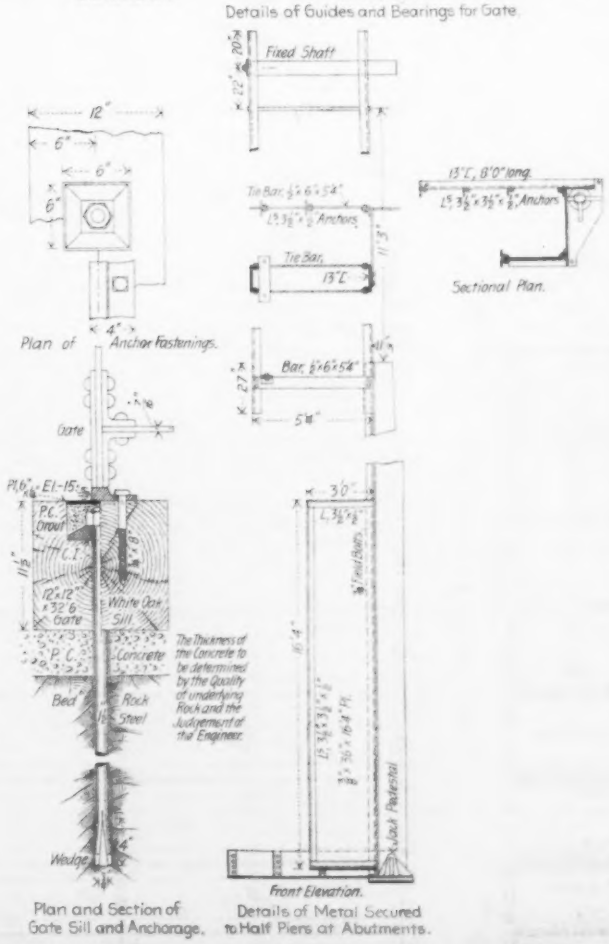
FIG. 96. PLAN AND SECTIONS SHOWING CONSTRUCTION OF STEEL SLUICE GATES.








Oak Gate Sill
Vertical Section C-D of Bottom Girder Showing Gate Bearing.
31'5" out to out
Horizontal Section of End Girder, Showing Bottom Girder and Roller in Plan.
End Elevation of Gate Head.
Horizontal Section E-F of End Girder.



SLUICE GATES FOR REGULATING WORKS, CHICAGO MAIN DRAINAGE CHANNEL.

Isham Randolph, Chief Engineer.
Thomas T. Johnston, Assistant Chief Engineer.
E. L. Cooley, Principal Designing Engineer.

FIG. 95. DETAILS OF GUIDES, BEARING SILLS AND COUNTERWEIGHTS FOR SLUICE GATES.

CHAS. HART & BONS, LITH., 26 VESEY ST., N. Y.

with far too many valuable privileges for no return or for merely nominal considerations. The few examples to the contrary are but oases in a dreary waste. Moreover, in thus giving away these privileges, enormous monopolies are often created, which enter into local and even state politics, controlling instead of being controlled by city authorities, and in many ways interfering with the proper management of municipal affairs.

In this connection the civic administration of Paris may be studied with much profit. In the one item of gas-lighting, Paris not only has all its streets and public buildings brilliantly lighted at the cost of production, but it has also received in cash over $40,000,000 in the last 10 years from the private company furnishing this gas. The city, further, prevents this company from watering its stock, and compels a division with the city of all profit above a reasonably large dividend. The same control is exercised over electric lighting, and the tendency in Paris is now decidedly towards the laying and maintenance of all street paving by the city authorities without the intervention of contracting parties.

While the conditions prevailing in Continental Europe are very unlike our own, the ruling principles of civic government in France and Germany seem to be founded upon the same economic ideas which control great private business corporations here as well as there; and until we do something of the same kind we must continue to pay undue profit to those who perform duties which could quite as well be performed by the cities themselves. The stumbling block in the way is a general distrust in the average representative of the cities' interest in the case; but absolute city ownership, coupled with the open sale of the privilege of operation of municipal monopolies, should go far towards holding in check any improper use of civic position or power. The administration of the affairs of a modern city should be conducted on strict business principles, in the interest of all the citizens, and not for the benefit of a few self-selected individuals.

COMBINATIONS AMONG CONTRACTORS.

There are probably few contractors who make a business of bidding on public work who do not at some time or other have the question brought before them as to how far they are justified, morally and legally, in entering into combinations with their competitors.

There is a general disposition on the part of the public to condemn the restriction of competition as if it were a crime; and this disposition is felt and resented by many men who believe, rightly or wrongly, that the circumstances in which they are placed fully justify their action in joining such combinations. In view of these facts, it has seemed to us that a discussion of some of the foundation facts in connection with this subject and of the equities between the parties in the fixing of prices for contract work may tend toward a better and fairer understanding of the subject on the part of both contractors and engineers.

In the first place, we may lay down the general principle that the engineer or other executive officer of a public or private corporation who has the responsibility of letting contracts for work or materials desires in general to let them at the lowest possible price. We are assuming, of course, that he is honestly endeavoring to do his duty as an agent or trustee of the public or private corporation which he serves. Also that such good work and good materials as the best interests of the purchaser may require are to be secured in any case.

On the other hand, the contractor—and by this term we include every firm or company which submits bids for work or materials—always desires to secure the highest prices, in order to make the largest profit possible.

It ought to be entirely plain to every one, that the contractor has just as much right to endeavor to secure a high price as the party who lets the contract has to secure a low one. We are so accustomed, however, to see newspaper articles in which high prices on public contracts are made the basis of attack and condemnation of public officials, that quite naturally some blame in such cases appears to attach in the public mind to the contractor. This idea is a mistaken one. The contractor is in business to make profits, and so long as the party purchasing relies entirely on competition to fix prices, the contractor is under no obligation, moral or legal, to do anything but get the highest price which competition will permit.

Of course, where the purchaser does not appeal to the competitive principle to fix prices, the contractor may well refrain from fixing a price which would give him an exorbitant profit. For example, a manufacturer of a special line of machine tools covered by patents might be asked to submit a proposal to equip a factory with them. He may know that no other firm will or can bid against him, but he knows also that if he fixes an exorbitant price his offer may be refused, or even, if necessity should force its acceptance, the price he has asked on this order may injure his chances for future business. Or, to take another example, a contractor may be informed that he alone will be asked to submit bids on certain work, with the understanding that he is to name a price which is as low as he can make, and leave him a fair margin of profit.

But take, now, a contrary example: Suppose a city asks bids for building a sewer. Through ignorance or mistaken economy, the work is not properly advertised, and a contractor who does learn of it in time to prepare a bid has reason to believe that few or no other contractors will present bids. He will be entirely justified in fixing his price in accordance with that knowledge. Or, again, a contractor may have special information that a certain piece of work is far less difficult than the engineers in charge of it suppose or the specifications indicate. He will be entirely justified in fixing his bid in accordance with this knowledge, no matter what enormous profits it may yield him, just as much as he would be justified in refraining from bidding at all, or naming a high price if he had reason to believe that especial difficulties were likely to be encountered.

We have laid down these elementary facts—which may to many seem too simple to need to be stated—to counteract the too common impression that high prices on a contract are in some way discreditable to the contractor. It ought to be clear from the preceding, that when the principle of competition is appealed to to fix prices, the contractor is justified in taking any fair and honest means of securing the highest possible price.

But now comes the difficult question, What are "fair and honest" means, and what are not? We may lay down, in the first place, the principle that it is not "fair and honest" to tamper with the agents of the private or public corporation whose work is to be done, in order to secure an advantage. We are aware that the temptation to do this comes in a thousand insidious forms, and that in many cases a contractor may honestly believe himself forced to undertake work of this sort. The levying of blackmail by corrupt members of state legislatures has its counterpart in many cities in the revenue which corrupt members of city councils levy upon successful contractors, and in not a few private corporations in the "division of spoils" which officers of the company demand. But all these things must be unhesitatingly condemned. The very men who do them must confess, if they are candid, that all gains which a contractor makes through collusion with the agents of a corporation, and which cause loss to that corporation, are gains which are neither legally nor morally justifiable.

We have said above that when the principle of competition is relied upon to fix prices, the contractor is justified in using any fair and honest means to secure the highest possible price. Are attempts to limit competition on the part of the contractor to be considered "fair and honest" means? Those who answer this in the negative declare that when the principle of competition is appealed to to fix prices, it is the intention that that principle shall have free course. Suppose the contractors agree that a certain one among them shall take the contract, while the others submit figures made up beforehand merely to deceive those receiving the bids, and to make them believe that real competition exists, and that the price named in the lowest bid is really a moderate one. The essence of fraud, it is said, is the attempt to deceive. Here is the attempt to deceive unquestionably. Is not this combination among the contractors essentially fraudulent?

From the legal point of view, the old English common law has always held that combinations to restrict competition were "against public policy" as being contracts in restraint of trade, and so were unenforceable. Numberless attempts have been made to punish those who make combinations to restrict competition, but the laws passed with this end in view have almost invariably been of practically no effect.

The difficulty with all such laws is that they set out to force a man to do something which he is in no way obliged to do. If a contractor does not choose to compete with another, not all the laws on the statute book can compel him to do so. The lawmakers attempt to get around this difficulty by legislating against the contracts to restrain competition, and fixing punishments for those who make such contracts; but it is an unsettled question whether such legislation is constitutional. According to the common law, it has always held that any one had a right to make such contracts, but they must run their own risk as to carrying them out. The common law, as usually interpreted, will not enforce such contracts, but it will not hinder parties from making them if they choose.

At the present time we have on the one hand a far greater and more general tendency toward the limitation of competition by the formation of trusts, by the consolidation of competing firms and corporations, by the formation of trade associations and by agreements between competitors than has ever before been known. There is hardly a trade or industry anywhere in which the limitation of competition is not being attempted or accomplished, to a greater or less extent. On the other hand, in response to a strong public opinion, we have strong efforts to oppose by legislation all this tendency toward the limitation of competition. Experience appears to show, however, that these laws are practically powerless to stem the current. The economic laws which bring about this general limitation of competition are more powerful than any statute laws.

Under these circumstances the court decisions upon these questions are widely at variance and depend more upon the attitude of mind of the judge who writes the decision than on anything else. The conservative judges, who adhere strictly to precedents and old-time practice, follow the common law, and still hold that contracts in restraint of competition are void and non-enforceable. The more advanced judges, who are better acquainted with modern trade and economic conditions, recognize by their decisions that under certain circumstances such contracts may be legally defensible and ought to be enforced. Only a few days ago a case was decided in this way in the New York courts. The manufacturers in a certain line had sold their establishments to a concern which proposed to monopolize the trade, with the condition that they were not again to enter that business. One of them did so, however, and when suit was brought against him for violation of his agreement, pleaded that the contract was "in restraint of competition" and not enforceable. The judge overruled this plea, and compelled him to abide by the agreement which he had made. Probably if the same suit had been brought before a judge in the South or in some remote country district, a reverse decision would have been given.

We may sum up the legal aspect of the question, then, by saying that the statute laws which fix a punishment for the restraint of competition are seldom, if ever, enforced; but that any contractor who makes an agreement to restrict competition will do well to bear in mind that he should rely solely on the good faith of the parties with whom he makes the compact to carry it out. If they prove false to him, his chances for securing enforcement of the compact, if he goes to law, will be at

best no more than even. And a man who goes to law on such chances is guided by his temper rather than his purse.

We have pointed out above that combinations among contractors frequently involve the attempt to deceive. Not every attempt by contractors to limit competition does this, however. Suppose a half-dozen large manufacturers in a certain line, who, by the superiority of their plants, are able to name better prices than any of their smaller competitors, agree to divide up the territory and not to send their agents into each other's districts. In this way they are not only able to avoid cutting each other's prices to a point which leaves no profit, but by reducing the heavy expenses of their sales department and by shipping to each district from the manufactory located nearest to it, it may very possibly happen that prices will in the long run be at a lower level than would be the case were "cut-throat" competition to continue. Certainly it is hard to say that such restriction of competition among contractors is not justifiable, legally and morally.

Again, it sometimes occurs in the highway bridge business that when the agents of a dozen or more companies come together to attend a letting, they find that the officials in charge of the letting are anxious to grant special favors to the bidder who will "see" them. We understand that in some such cases the agents form a combination and agree to leave the covetous officials in the lurch. Certainly this is a form of combination among contractors which is altogether meritorious.

And now let us take the case of out-and-out combination, where the bidders agree beforehand upon what prices will be named by each one, what firm shall be the successful bidder and what division of its profits it shall make with the other parties—"pooling," as it is termed in the bridge business. What is there to be said in defense of this practice?

In the first place, it is urged that pooling is a necessity in order to get living prices. Suppose a dozen or more bidders are present at the letting of a small country highway bridge costing one or two thousand dollars. The average expense of each bidder in attending the letting will not fall short of $50. These expenses must in the long run be paid by the buyers of bridges, manifestly; and it is certainly more just that they should be paid for by the buyers of the bridge which has caused the expense than that they should be charged to other purchasers of bridges. Any one who is familiar with the conditions which obtain at the average highway bridge letting is aware that competition will force prices down to a point which leaves no profit to the manufacturer if pooling does not take place and a scramble for the contract ensues.

The same thing occurs in many other lines. It very often occurs that two or three large establishments with superior facilities will be able to bid much below their competitors; but if competition between them was entirely free, it would grow so fierce that one or the other would go to the wall. Some sort of understanding between them is essential if each is to continue to do business.

Let us sum up, then, the position taken by the contractor who holds that attempts to limit competition are among the "fair and honest" means which he may use to secure a high price for his work. He declares, first, that he has a legal right to restrain competition; second, that in many cases such restraint is necessary in order to secure him a price at which he can live; third, that inasmuch as the engineer in charge of letting contracts fosters competition in every way possible, it is only fair that the contractor should have the right to do what he can to restrain it; fourth, that in forming combinations he is only in accord with the modern tendency in all industry and trade and with the leading spirits in the financial and business world.

Such is the position taken by the contractor, and who shall say it is not a strong one. As a practical matter, if the legal right to restrain competition be conceded, we may call such restraint fair or unfair; the contractor who sees a chance to better his profits by such restraint will be pretty certain to do it, and who shall say he is blamable therefor?

As for such evils as grow out of combinations among contractors, they must be remedied by greater intelligence and watchfulness on the part of those who have the letting of work. It is their business to foster competition and to see to it that a sufficiently wide circle of competitors is interested in any contract to make combination among them difficult. In New York city contracts the following clause is inserted, and is required to be sworn to, as a safeguard against combinations:

> We further declare that the estimate is made without any connection with any other person or persons making an estimate for the same work, and is in all respects fair and without collusion or fraud.

Under this clause an indictment for perjury was recently returned against a contractor who is alleged to have divided the profits of a contract with two of his competitors. We refer to this merely as a sample of the means which are sometimes employed by those who have the letting of contracts, in order to checkmate attempts at combination. But the best of all methods of meeting combinations among contractors is for those who have the letting of the work to be thoroughly posted as to what the work should cost, and to reject all offers if none are secured at a reasonable figure. So long as combinations among contractors do not raise prices above a figure which gives the contractor a living profit, we take it that no one suffers material injury by the restraint of competition. If such combinations operate in any case to raise prices to an excessive figure, those in charge of the letting have the remedy in their own hands, and if they are honest and competent, will not fail to use it.

LETTERS TO THE EDITOR.

LONGITUDINAL ANGLE STIFFENERS FOR CHORDS OF PLATE GIRDERS.

Sir: In your review of "Plate Girder Railway Bridges," by Mr. Fitzmaurice (Eng. News, Oct. 24), you mention as novel the stiffening of girder flanges by riveting angles along the edge of cover plates. This method of stiffening is quite commonly used on the upper flanges of girders for traveling crane bridges where the trolley runs on the upper flange. The accompanying drawing shows a cross-section of a girder for a 60-ft. span bridge, as built by the Shaw Electric Crane Co., of Muskegon, Mich. The angles on outer edge, 5 ins. × 5 ins. in size, are continuous between the end cross-beams connecting the girder.

Yours truly, Walter R. Marden.

Pittsburg, Pa., Oct. 28, 1895.

(In the case mentioned by our correspondent the use of the top chord as a track for the bridge crane of course suggests the method of stiffening illustrated, but for plate-girder railway bridges there is no such reason for the construction, and it is seldom, if ever, used for railway bridges in this country, so far as our knowledge goes. Perhaps some of our readers can advise us to the contrary.—Ed.)

A PROBLEM IN STATICS.

Sir: The Trenton Iron Co. has built a cableway for the contractors for the Holyoke Dam having a span of 1,615 ft., one tower being in Holyoke, Mass., and the other in South Hadley Falls, Mass. A feature of this cableway is the 2-in. patent locked wire rope used for a main cable.

When the towers were first built the panels of the bents were crossed by but one diagonal piece, as shown by the center lines in Fig. 2. The question arose as to whether or not it would be desirable to cross the panels by additional diagonals running the other way. That such a construction is desirable was shown as follows. Fig. 1 gives about the average position of the resultant stresses acting on the towers. For the Holyoke tower, the tower to the left, Fig. 1, the resultant stress passes to the right of the point, 1, Fig. 2, while for the South Hadley Falls tower the resultant stress passes to the left of the point, 1, Fig. 2. The direction of this stress is dependent on the position of the load on the cableway, and may in each case move so as to pass the point, 1, on the opposite side. The strain diagrams to the left, Fig. 2, are for the South Hadley Falls tower; those to the right for the Holyoke tower. In each case one diagram is for the bents as first built, and the other for the bents if the diagonal pieces had been placed the other way. The strain diagrams show that when the resultant stress passes to one side of the point, 1, one construction is preferable, and when the stress passes to the other side of the point, 1, the other construction is preferable, the stresses on the vertical and battered columns being considerably less in one case than in the other. Hence it is desirable to place braces both ways. W. L. Garrels.

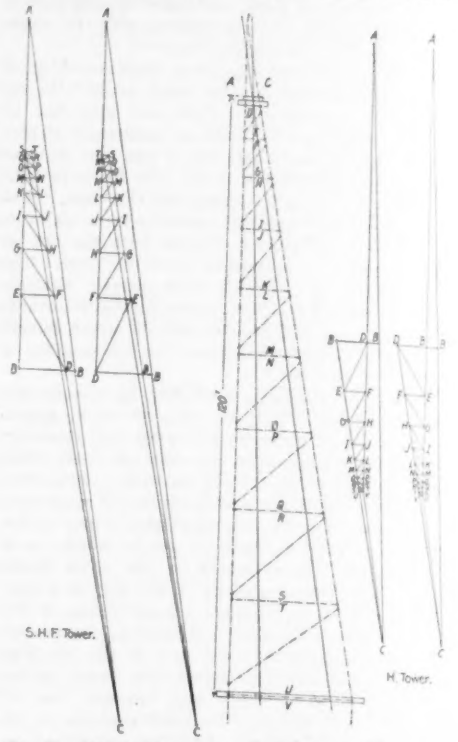


Fig 2, Strain Diagrams of Cableway Towers at Holyoke, Mass.

Holyoke, Mass., Oct. 23, 1895.

THE FLOOR CONSTRUCTION OF THE MANHATTAN BANK BUILDING.

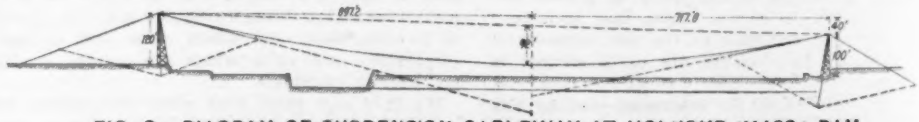
Sir: Permit us to call attention to the fact that an error was made in your illustration of the system of so-called fireproofing used in the Manhattan Bank Building, which appears in your last issue, in that the hollow tile blocks are shown entirely filling the space between the floor beams. These beams are 15 ins. deep, and the hollow tile blocks, resting on the small transverse tees, as shown, are but 4½ ins. deep—5 ins., including the dovetails for the support of the plaster ceiling. This, of course, leaves 10 ins. of the beam exposed. How men of such general intelligence as bank directors and insurance underwriters could have imagined that a building was fireproof with the tension section of its girders entirely exposed to the flames below the floor, as shown in your illustration, and the compressive section of its floor beams entirely exposed to the flames above the floor, is beyond our comprehension.

Yours respectfully, Henry L. Hinton,

Eastern Manager, Pittsburg Terra Cotta Lumber Co.

Postal-Telegraph Bldg., New York, Nov. 18, 1895.

(When making an examination of the Manhattan Building subsequent to the fire, the condition of the floors was such that it was difficult to determine whether there was one or two courses of tiles. To give the designer of the building the benefit of the doubt, we represented the space below the floor as entirely filled with the fireproofing material. The correction made in the above communication only intensifies the points brought out in the original article.—Ed).



FID. 2. DIAGRAM OF SUSPENSION CABLEWAY AT HOLYOKE (MASS.) DAM.

TESTS OF EFFICIENCY OF NUT LOCKS.

Sir: From a number of letters which I have received and from what has appeared in your journal, I venture to assume that some interest has been manifested in my investigation of the results of comparative tests of nut locks, as published in your issue of Oct. 3. I therefore send the results of an additional year's tests, September, 1893, to September, 1894, for the same nut locks, and the same conditions obtaining as in the published diagram. The number of bolts loosened, of course, means the number loosened in addition to those referred to in the diagram.

G. E. Hayward,
Assistant Engineer, C., L. & W. Ry.

New Philadelphia, O., Nov. 8, 1895.

Results of Tests of Nut Locks.

Name.	Mark on diagram.	No. loosened in year, Sept., '93, to Sept., '94.	Time of service, years.	Total No. loosened.
Bolts without nut locks..	A	2	2	15
American nut lock	B	0	2	3
" washer No. 1...	C	0	2	0
" " No. 2...	D	2	2	6
" " Harvey..	E	1	2	3
Eureka	F	0	2	2
Excelsior single	G	1	2	3
" double	H	0	2	4
Ideal	I	1	2	5
National	J	0	2	1
Noble	K	1	2	7
Servis	L	2	2	11
Standard	M	0	2	1
Verona.....	N	0	2	0
Harvey grip thread	O	1	2	10
Check nut	P	2	2	8
Dill (positive)	..	0	1⅜	0
Young (reversible)	..	0	1⅜	0
Positive (spring)	..	0	1⅜	0
Champion bolt	..	1	1⅜	1

(The tests, as described in the article referred to, consisted in putting on 20 locks of each kind in September, 1892, and noting the number loosened between that time and September, 1893. Four other kinds of nut locks were applied in February, 1893. To our correspondent's table we have added a column showing the total number of each kind which became loose from the time of application to September, 1894.—Ed.)

CONCERNING ANTI-RUST PAINT.

Sir: In your mention of our pamphlet on "The Painting of Metallic Surfaces," in your issue of Nov. 7, you state that it "is a brief, but excellent presentation of the advantages of red lead and linseed oil for the purposes intended." Now, our intention was to distinctly state that in at least one important property, red lead failed of being an ideal protection for iron. For this reason we advocated a second coat of our "Anti-Rust." We wish to state with absolutely no reservation whatever, and we are willing to back this statement up, that as a result of an extended series of experiments on our part, we are fully convinced of the merits of "Anti-Rust" as a finishing coat for iron painting. You will readily see, therefore, that we were somewhat astonished and disappointed to find that you had quoted us as advocating only red lead and linseed oil for painting iron.

Further, in support of this we would say, that "Anti-Rust" spread on a warm surface (70° F.) of bare sheet iron covers 700 to 1,000 sq. ft.; while on cold iron (32° F.) its covering capacity varies from 500 to 750 sq. ft. It has been shown in the experiments above referred to, that, rating the durability of a coating of "Anti-Rust" as 100 in ordinary atmospheric exposure, red lead would rate as, approximately, 90. When the atmosphere contained considerable quantities of sulphur, or other acid gases, the ratio was enormously increased, "Anti-Rust" still remaining 100, while the effectiveness of red lead fell to something below 30. We specially emphasize this fact, because many advocates of the use of red lead base their opinion upon its recorded durability when exposed to ordinary temperature. We can state that this "Anti-Rust" paint has stood the sulphurous fumes of a sulphuric acid plant for over 15 months, without showing the least signs of deterioration.

Yours very truly,
Harrison Brothers & Co.

Philadelphia, Pa., Nov. 13, 1895.

(Our apologies are due to our correspondent for a somewhat too hasty review of the pamphlet referred to. So much space was devoted in it to setting forth the generally good qualities of red lead and linseed oil as a first coating that the reviewer omitted to note the one quality in which it was said to fail—viz., the more or less porous nature of this paint, and the advantages of covering it with another paint, which, when dry, should give an absolutely waterproof surface. It is to this important covering coat that our correspondent refers, and we are pleased to make this correction, so that a proper idea may be conveyed of the contents of the pamphlet noted.—Ed.)

THE PROPER CONSISTENCY OF CONCRETE AFTER MIXING.

Sir: In the specifications for concrete, both of Portland and domestic or natural cement, issued by a prominent public state organization of Illinois, it is required that: "On being placed, the concrete shall have a wetness such as to permit quaking, or mobility, likened to liver." As this specification requires in Portland cement concrete of the constituents named, about 60% or more of the weight of the cement of water, and whereas less than 20% of its weight of water is required for crystallization in Portland cements of high grade, it seems that the specification is utterly bad, and will result in a very porous and weak concrete, even though the proportions specified are unusually rich in cement. I write to inquire whether this specification is in accord with good practice, and to ask what, if any, authority exists for it? I believe the best practice is to furnish water sufficient, as near as practicable, for crystallization only, and to effect this, as near as may be in practice, to make the concrete so that it shall well compact on ramming, without quaking or exhibiting water, or "laitance," which is an uncementitious nuisance, at the surface, and then after the cement has taken hold of the other ingredients, to supply an additional amount of water, to be taken up or rejected by the cement, as its chemical necessities demand. The rule quoted above indeed requires at first fully twice the necessary water of crystallization, or about 50% of the weight of the cement. Why increase it?

In my mind the specification is ruinous to the concrete, unnecessarily wasteful in cement in its proportions, and contrary to all good practice, and I should like to see some discussion on this subject from experienced engineers. Either the wide practice in making and depositing the highest grades of Portland cement concretes, or artificial stone, is wrong, or else the specification is destructive and ruinous. It is certainly important to know which practice is right.

It is distinctly contested herein that it is impossible to make a mixture for concrete that will compact on ramming, without becoming "jumpy" or pulverulent, that will not contain enough water for the crystallization of the mass; that if effectively protected against evaporation, such non-quaking compacted mass will be the strongest possible, and that under any conditions additional water should be supplied after consolidation by ramming, and not before. That an excess of water means a weak and porous concrete, in direct proportion to the excess, but that a slight deficiency may be readily supplied and appropriated by the cement.

I contend also that no "quaking liver" concrete can be used for monolithic structures of slow-setting cements of great height, retained by ordinary forming. The enormous fluid pressure will prevent. I contend, also, that if arrangements be made to supply water afterwards, it is better to have too little than too much initial water in any concrete mass, if a non-absorbent stone is required.

S. F. X.

Chicago, Ill., Oct. 28, 1895.

(As we found that the specifications referred to in the above letter are those drawn for the regulating works at the lower end of the Chicago Drainage Canal, we referred the above letter to Mr. Isham Randolph, Chief Engineer Sanitary District of Chigago, and print his reply below.—Ed.)

Sir: Yours of Nov. 2, with the criticism of our concrete specifications, reached me in due course of mail, I am at a loss to know why, if made "with an honest and good heart," "S. F. X." should not have made his criticisms over his own signature. His not doing so indicates a merely captious spirit, which he would not like to have ascribed to his proper personality. However, as you wish to know the reasons of our adopting these specifications, you shall have them. Mr. T. T. Johnston, our Assistant Chief Engineer, has had charge of a series of experiments with cement mortars, etc., conducted with great painstaking and care, and has, also, had large experience in the use of concrete in foundations, etc. He has, besides, collated the very valuable experience derived from other sources. Our specifications are the outcome of the results of his investigations, and I cannot do better than transmit a copy of his letter to me in answer to my request for the information which I needed for my reply to you. I have neither inclination nor time for any controversial discussion, but you are always welcome to the data from which we work out our conclusions.

Yours truly, Isham Randolph,
Chief Engineer, Sanitary District of Chicago.

Chicago, Nov. 11, 1895.

To Isham Randolph, Esq., Chief Engineer.

Sir: The "S. F. X." criticism on the merits of our specifications for concrete for "Regulating Works" is erroneous. In preparing plans and specifications for said work, I was governed by conclusions as follows: (1) The structures being in the nature of a dam, should as nearly as possible be watertight. (2) They should be sufficiently strong.

Concrete construction was adopted. The degree to which it will be watertight will depend on the quality of the component parts of concrete, water excepted, entering into a cubic foot of masonry. In the operation of placing concrete, unless it be made unduly expensive, it is believed that the "quaking," "liver-like" mixture will insure a more dense result than a non-quaking mixture, and, consequently, a more nearly watertight construction. The mixture should, of course, be judiciously rammed, and be in sufficiently thin layers.

The ultimate strength of the concrete, it is believed, will be greater if it has more density, given proportions of ingredients being assumed. Of course, dry mixtures can be rammed to desired density, but not with as much certainty as quaking mixtures.

The critic thinks there is too high a proportion of cement used in the mixture.* Perhaps there is for a perfect mixture, but the variable perfection of incorporation justifies such mixtures in proportion to the importance of the work. It may cost less to use an excess of cement, and have less manipulation and inspection. The notions of our critic as to the quantity of water needed for a quaking mixture are erroneous. If he will use sand and stone thoroughly wet, and mix with a neat cement mortar (ingredients being proportioned as in our specifications), he will find a quaking mixture where the water in the mortar is about 25% of the weight of the cement, or only about 5% more than is needed for crystallization. In other words, where the water used is 50% or 60%, or more, of the weight of the cement, nearly all of it in excess of about 25% will be taken up in the pores of the sand and stone. It follows that the amount of porosity in the mixture, due to excess of water, may be measured by the volume of a mass of water weighing about 5% of the weight of the cement, or less than 1% of the volume of the masonry. The critic might well have stated in numbers to what extent "an excess of water means a weak and porous concrete." Our own investigations lead to the belief that while excess of water retards setting, still a limited excess leads to a greater ultimate strength.

There will, doubtless, be some difference of opinion among engineers on the subject in hand, but our own investigations as to the influence of excess of water in mortars, both with laboratory briquettes and with mortar-box briquettes, leads to the conclusion that the specifications, far from being "ruinous to the concrete," and "destructive and ruinous," are about right.

Very respectfully, Thos. T. Johnston,
Assistant Chief Engineer, Sanitary District of Chicago.

Chicago, Ill., Nov. 8, 1895.

(As the above discussion will doubtless attract general attention to the specifications for concrete on the Chicago Drainage Canal work, we reprint below in full the specifications for the regulating works, so far as they relate to concrete and its materials —Ed.)

(m) All sand used to be clean, sharp and free from loam or pebbles in a degree to be approved by the Chief Engineer.

(n) The broken stone shall be of sound and hard limestone, free from dust and dirt, the largest stone being such as will pass through a ring one (1) in. in diameter.

(o) The best Portland and natural cements shall be used, brand and quality to be subject to approval by the Chief Engineer, who shall, from time to time, cause such tests to be made as may seem to him proper for determining the quality of the cement which is to be used in the work. The development of tensile strength for Portland cement shall be 400 lbs. per sq. in. after having set seven days, and for natural cement 100 lbs. per sq. in. after having set seven days. All lumpy, dirty or damaged cement shall be rejected; also damaged and short weight packages.

(p) Portland cement mortar shall consist of 1 part by volume of the specified Portland cement to 2 parts of the specified sand. The mixture shall be made and used in a manner to be approved by the Chief Engineer, in order to secure first-class workmanship.

(q) Natural cement mortar shall consist of 1 part by volume of the specified natural cement to the 1 part of the specified sand. This mixture shall be made and used in a manner to be approved by the Chief Engineer, in order to secure first-class workmanship.

(r) The Portland cement concrete shall consist of 2 parts by volume of broken stone to 1 part by volume of the specified Portland cement mortar. The stone and mortar shall be thoroughly incorporated, so as to make a homogeneous mass. In the foundations the concrete shall be laid in courses not exceeding four (4) ins. in thickness, and shall be rammed in a manner to

* "Two parts of broken stone to one part of specified mortar," as our specifications read, means one part of cement, 2 parts of sand, and something more than 4 parts of broken stone, depending on the extent to which the mortar mixture exceeds two of the units of measure. Perhaps our critic, in common with some others, has not understood it this way. The propositions are of such ordinary use that it is difficult to see how they are "contrary to all good practice."

be approved by the Chief Engineer. On being placed, the concrete shall have a wetness such as to permit quaking or mobility likened to liver.

(s) The natural cement concrete shall consist of 2 parts by volume of broken stone to 1 part by volume of the specified natural cement mortar. The stone and mortar shall be thoroughly incorporated, so as to make a homogeneous mass. The concrete shall be laid in courses not exceeding in thickness two courses of brick, and shall be rammed in a manner to be approved by the Chief Engineer. On being placed, the concrete shall have a wetness such as to permit quaking or mobility likened to liver.

NOTES AND QUERIES.

Prof. W. J. Roberts, Pullman, Wash., writes us that Anthony's "Elements of Mechanical Drawing" gives the same method of constructing an ellipse as that shown by Mr. Benjamin F. La Rue in our issue of Oct. 24.

Mr. John F. Geiger, of Lemont, Ill., informs us that the engraving of "a skip load" on p. 166 of our issue of Sept. 12 was reproduced from a photograph taken and copyrighted by him. The existence of Mr. Geiger's copyright was unknown to us when we published the cut. Copies of the original photograph can be obtained by addressing Mr. Geiger.

Th. D., C. E., inquires the best course to pursue in depositing dredged material on shore when a river falls to such a low stage that the banks are higher than the top of the ladder of the endless-chain dredges used in the work.

We should think the system described in our issue of June 13, 1895, might be applicable; or perhaps a centrifugal pump might be installed to give the material further elevation sufficient to discharge it on shore.

The conduit electric railway of the Metropolitan Co., at Washington, D. C., gives fair promise of being successful during the coming period of the year, usually fatal to the efficient operation of underground systems. The installment in this case has been very thorough, extraordinary endeavors having been made to provide a drainage system adequate to cope with the conditions resulting from the severity of Northern winters. The means by which it is hoped to carry off all refuse and water finding its way into the conduit consists of a series of pits, 20 ins. wide and 6 ft. deep, extending across both tracks, and situated at intervals of 400 ft. or less. At one end of each pit, where connection is made with the sewer, the depth is increased to 9 ft., thus forming a basin where all refuse collects, and may be removed through a manhole. The conduit itself is very simple in construction. Two Z-bars, with vertical web, are placed with their upper flanges at the street level, with the space between their edges forming the slot. To the bottom flanges are fastened the porcelain insulators supporting the T-bars, which serve as conductors. Drip flanges are also supported by the bottom flanges of the Z-bars, and so placed as to protect the conductors from all moisture falling through the slot. The contact plow moves between the T-bar conductors, and bears laterally upon their vertical surfaces. The conduit is backed with concrete, and offers every facility for rapid drainage. With the comparatively favorable conditions so far existing, the operation of the road is said to be quite satisfactory. Its behavior under more trying circumstances will be watched with interest.

Three self-propelled or motor carriages were shown in service recently at Tunbridge Wells, England, all being French machines. The first, built by Messrs. Peugeot, of Paris, weighed 1,456 lbs., and can run 200 miles with one charge of petroleum spirit. The second, built by Panhard & Levassor, of Paris, has a Daimler petroleum motor, and has been used extensively on English roads by its owner. The third was a steam motor hauling a carriage, and our contemporary, "The Engineer," considers that it would have been better not to exhibit it. The motor weighed nearly two tons, and was quite out of place in hauling a pleasure carriage, as it was noisy, emitted clouds of exhaust steam under the carriage, and left behind it an unpleasant sulphorous smell of burning coke. Such a machine gives no idea of what can be done with steam propulsion on carriages of suitable construction. This machine was built by De Dion & Bouton, of Paris. The construction of the carriage bodies and wheels is said to be excellent.

A direct, submarine cable, about 1,000 miles long, is to be laid by the Japanese government to connect its newly-acquired territory in Formosa with the other islands in the group. The cable is now being made in England, and a Glasgow firm is building a 2,500-ton steamer especially adapted for cable-laying. There is not now a telegraph wire on Formosa; but the Japanese propose a number of lines as one of the first steps in the further development of this island.

NOTES OF TRAVEL; CHICAGO TO NEW ORLEANS VIA ST. LOUIS, ILL.

(Editorial Correspondence.)

New Orleans.

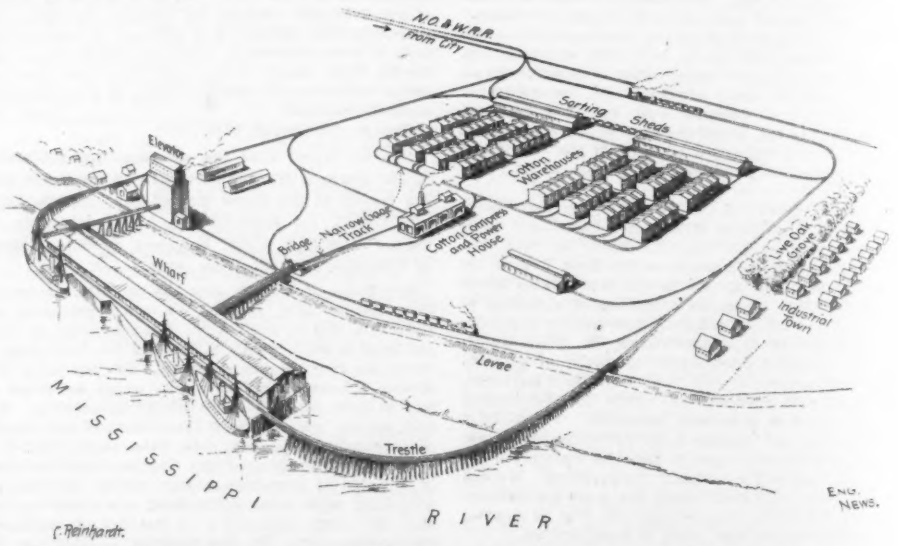
New Orleans presents a curious mixture of the old and new in engineering, as it does in everything else. Although a comparatively old city when most of the Great West was unexplored prairie, it is only within a half-dozen years that it has begun to get the modern improvements which existed in the larger cities of the Northwest a score of years ago. In street paving, drainage and sewerage New Orleans is 50 years behind the times; in rapid transit, water supply and garbage disposal it compares favorably with the large cities of the North. As a prominent city official expressed it, New Orleans is a city of incongruities. It is but just to say, however, that now that the city has taken hold of the question of municipal improvements, a tendency is evident to begin at the bottom and do it thoroughly.

The great problem which now confronts the people is that of drainage, as the readers of Engineering News know. The conditions are in many respects peculiar. By far the larger part of the city is below the level of the sea, so that a gravity flow is not to be had with the natural slope of the ground. Coupled with this unfavorable topography for drainage is the very heavy rainfall of 6 ft. per year, which comes in the shape of short, heavy downpours, reaching often 6 to 7 ins. per hour, and are followed by long periods of drought. During the storms the open gutters by which the city is now partially drained are roaring torrents, while in the dry spells they have not sufficient current to prevent the formation of stagnant pools covered with green scum at every street corner and in the depressions of the paving. In solving the problem of drainage, therefore, the engineers have had to provide channels which could accommodate the heaviest rainfall, and also carry the slight flow of the dry spells in an equally sanitary manner, and, moreover, to establish artificial gradients, to enable the flow through the level city streets. The general details of the drainage system were described in Engineering News of May 30, 1895, and need not be mentioned here, except to say that a system of open channels will take the water from the street gutters, and will have pumping plants at suitable points to secure the requisite flow. This drainage system will take only the surface water.

City Engineer Linus W. Brown is rapidly getting plans and specifications into shape to bring before the city council, and he hopes to be able to get the whole work placed in the hands of a drainage commission independent of the city officials, but this is as yet a proceeding doubtful of success. Altogether the work will cost from $8,000,000 to $10,000,000, and it is exceedingly important to the people of New Orleans that this money be handled with honesty and judgment, and an independent commission, responsible to no one but the law creating it, will be altogether preferable to the regular city officials who can give it only divided attention at the best. However, the best form of doing the work, as well as raising the necessary funds, have all to be determined yet, and it is little use to speculate on the action of a city council in advance. It seems likely, however, that finances will be the rock upon which the council will split, and perhaps the whole scheme may yet be wrecked, despite the crying need of better drainage for the city.

The method which the city has adopted to secure sewerage is decidedly unusual. Up to 1894 household sewage was run into cesspools, while the manufacturing plants and other larger concerns had private drains, or sewers. In January, 1894, the city entered into an agreement by which Mr. A. A. Woods and associates were to build a complete sewerage system and charge certain rates for supplying sewerage facilities. The details of the agreement will be more fully considered at a future time, but in a general way the company will supply the people with sewerage facilities much on the same plan that private water companies, so common in the smaller American cities, supply people with water. The company is at work on its sewerage system, but as yet only an inconsiderable portion of the work has been done.

Much of the paving in the business section of the city is either cobblestone or stone blocks from 10 to 15 ins. square, and 10 or 12 ins. thick, but in the residence districts gravel and chert roadways are built. As most of the cobble and stone block pavement was laid before the War, and has been frequently torn up to lay gas and water pipes, it is in a pretty bad condition, and the city is already replacing it with more modern pavements. Belgian block, asphalt, wood, and, to some extent, very recently brick have been used, but wood pavement has proved unsatisfactory, and no more will be laid. As laid on a sand cushion here, cedar block pavement seemed to shrink loose during droughts, and when a heavy downpour came it would float up from its foundation. Nothing very definite could be obtained regarding the material and method of laying this wood block, but that it acted as it did was probably due to green timber and an improper filling of the joints. Indeed, the disrepute into which wood block pavement has come throughout the United States can be traced directly to the similar use of improper material and to inefficient construction. The same upfloating of the cedar blocks has been observed frequently by the writer in Chicago streets, but in every case an examination has shown the joint filling to be insufficient or lacking altogether, or else some other glaring fault of construction.



CLEARING HOUSE TERMINAL FOR NEW ORLEANS & WESTERN R. R AT PORT CHALMETTE, NEAR NEW ORLEANS.

The new brick pavement being laid in New Orleans is bedded in sand on a 6-in. concrete foundation. But very little of this has been put in, or, indeed, of any other modern pavement, except the gravel and chert roads in the residence streets.

The cleaning of the streets is done partly by the city and partly by a private company. The city does the sweeping and the company carts away the refuse. All the refuse and garbage are disposed of by the Southern Chemical & Fertilizing Co., which has a combination reduction and cremating plant in the outskirts of the city. This plant is unusually complete, and will be described fully at a future time. Briefly stated, however, the garbage proper is reduced to make grease and fertilizer, and the other refuse is cremated. Tin cans, etc., are reduced in a cupola and cast into sash-weights and other rough commercial forms. A visit to the plant showed the work to be fairly good as far as any offensive odors were concerned, and, indeed, the isolated location of the factory makes unusual care in this respect unnecessary.

Rapid transit in and about the city is very satisfactory on the electric lines, but if one is compelled to use one of the combination nigger, mule and bobtail cars—of which a few remain—walking, even with the attendant excitement of jumping gutters, is, on the whole, preferable. These bobtail cars have no rear platform, but are provided with a coach step and grab-irons, by means of which one can swing himself into and out of the narrow door in the rear end. Fortunately for the disadvantages of this arrangement, one is sure of the car being stopped when he wishes to get off, a conspicuous placard informing him that at one ring of the bell the car will stop at the next crossing, and at two rings of the bell it will stop anywhere in the middle of the block. This last seems a very desirable arrangement until one gets off at the middle of the block and discovers that he must go to the next crossing anyway in order to get across the small creeks flowing in the open gutters at each side of the streets. The electric cars are large and handsome, and many of them are equipped with the Brill maximum traction trucks.

New Orleans is not a manufacturing city, and little of interest to the engineer is to be found in this connection. Probably the most important engineering work due to private enterprise now under way is the belt line and terminal system of the New Orleans & Western R. R. Co. This company has practically completed a belt line connecting with the various railways entering the city, and terminating in an extensive cotton-compressing and storage plant, grain elevator and wharves about 6½ miles down the river. Through the courtesy of the Chief Engineer, Mr. A. W. Swanitz, the writer was afforded an opportunity to visit the terminal work now being done. The accompanying sketch explains clearer than any words the plan and scope of the work. The belt line forms a loop around the plant, from which branches run to various parts of the ground, thus enabling cotton and grain to be taken from the various railway lines and stored, or, if desired, loaded on shipboard. At present all cotton entering the city has to be taken in drays to the warehouses and then carted from the warehouses to the vessels or railway lines. All of this drayage is avoided by the plant now being constructed, as a brief examination of the sketch will plainly show.

All the buildings are being built of brick, and every precaution taken against danger from fire by handling all the cotton in and about the warehouses by compressed-air locomotives running on narrow-gage tracks. No steam railway track comes within 240 ft. of the warehouses. Two compresses of 4,000 tons each will press the cotton, each press getting power from a battery of three boilers. A third battery of three boilers will operate an air-compressor for supplying the compressed-air locomotives. The warehouses are 16 in number, and each consists of five 60 × 90-ft. compartments. As stated, the warehouses are built of brick, and brick fire-walls separate the different compartments. Altogether, these warehouses have a capacity of 1,000,000 bales of cotton, or about one-third the total amount handled yearly at New Orleans. Specially-built trucks, cars and other machinery for handling the cotton into and off the cars and steamers are provided throughout. Complete sewerage and water-works systems have been constructed; cottages for an industrial town are being built, and a lighting plant constructed. Altogether the work will cost $1,500,000, and in a future issue of Engineering News some of the more interesting features will be described in detail. Part of the work is being done by the company and part by contract, perhaps the largest contract being that of Jas. Stewart & Co., of St. Louis, Mo., for building the elevator and warehouses.

Before leaving this work and closing these brief notes on New Orleans, it is interesting to note that this terminal plant occupies part of the historic ground on which the battle of New Orleans was fought. At the head of the grove of live oaks near which the industrial village is now going up are the ruins of the old De la Ronde mansion, in which the British General, Sir Edward Pakenham, died after the battle, while all about the ground the workmen of the company have unearthed cannon balls, and the bayonets and buttons which mark the graves of the more lowly participants in that bloody struggle.

A decision has been rendered against the ordinance passed in Brooklyn, N. Y., requiring all street cars to be fitted with fenders in a specified position, 3 ins. from the ground, the judge considering that this could not be complied with on account of the fore and aft lurching of the car. A new ordinance will be passed, requiring the use of fenders not more than 8 ins. from the rail, and extending 3 ft. in front of the car.

The water famine in Pennsylvania has caused much delay and expense on the railways entering Pittsburg, and those using the Youghiogheny River water for the engines have had much trouble with the engines, on account of the corrosive action due to the acids from the coke plants. Careful tests are being made of the water, and wells are being drilled to furnish a new supply.

The mechanical filter suit brought by the National Water Purifying Co. against the New Orleans Water-Works Co. has been decided in favor of the latter, in the civil district court at New Orleans. Some time ago the New Orleans Water Co. contracted for a mechanical filter plant, with a minimum daily capacity of 14,000,000 gallons. After the plant had been completed and operated for a number of months, as described in part in our issues of Aug. 30 and Sept. 6, 1894, the water company refused to accept it on the ground that it did not comply with the contract guarantees. The filter company brought suit for about $134,500, the contract price, and it is this suit which has just been decided. The patents of the old National Co. are now controlled by the New York Filter Co., of 145 Broadway, New York city. Mr. L. H. Gardner is Superintendent of the New Orleans Water-Works Co.

A suit for damages for the death of a man from typhoid fever, alleged to have been caused by drinking impure water, has been brought by a widow in a Western city.

A suit against the city of Altoona, Pa., to prevent it from polluting a stream with sewage was briefly noted in our issue of Nov. 14. A copy of the petition for an injunction, filed by the boroughs of Hollidaysburg and Gayport, together with private individuals, gives the details of the case as follows: The petitioners reside on or near the banks of the Beaver Dam branch of the Juniata River, Hollidaysburg, being about six miles south and 200 ft. below Altoona. The city of Altoona now discharges a part of its sewage into Mill Run, which empties into the stream mentioned above. It has recently contracted for the construction of an outlet sewer, or an extension of the present outlet, designed to serve a population estimated at from 15,000 to 20,000, this outlet to discharge into Sugar Run, about three miles south or southwest of the present outlet, and nearer the petitioners than the original outlet point. Sugar Run is a tributary of the stream along which the petitioners reside. The petition alleges that at certain times in the year there is little or no water in Sugar Run for the dilution of the sewage, so that the latter will produce offensive and deleterious gases. In times of rain the sludge deposits in the bed of this stream will be washed down to pollute the stream below, all of which, it is alleged, "will poison the air, pollute the waters and render them unfit for any useful purpose, and will offend the private and public comfort, will be injurious to health, will produce disease and destroy the territory thus affected for purposes of residence or business." On these grounds a perpetual injunction is asked "to abate the present nuisance, and to restrain the completion of the proposed sewer, and the emptying of the sewage into the said stream." The contractor for the new outlet sewer is made a party to the suit, which was brought in equity in the Court of Common Pleas of Blair county, on or about Nov. 1.

The new outlet sewer for East Orange, N. J., is reported as completed and in use for all the sewage of the town. This means the abandonment of the sewage purification plant, which has been in operation since 1888. The process employed was chemical filtration, supplemented by broad irrigation, and afterwards filtration for the effluent, all as described in Engineering News of Jan. 5 and 19, 1889; Feb. 15, 1890, and Dec. 1, 1892. The history of the plant, so far as available, indicates that in the endeavor to save the expense of chemicals, too much work was thrown onto the land, which was never well suited for the purpose, while the management was not always as capable as it should have been. The plant had enemies from the start, both within and without the town, and finally its opponents prevailed, and a contract was let for an outlet sewer, which has been completed to the Passaic River, at a cost of about $250,000. Mr. Jas. Owen, M. Am. Soc. C. E., of Newark, N. J., was the engineer for the outlet sewer, and Mr. Thos. Nevins was the contractor.

A system of portable jetties is advocated by Capt. Thos. W. Shields, of Cairo, Ill., for controlling and deepening the Mississippi River. As near as can be ascertained from the newspaper descriptions, Captain Shields proposes to build hollow steel caissons about 300 ft. long, 25 ft. wide and 10 ft. deep, wedge-shaped at both ends, and wherever a bar is formed to sink a caisson on each side, thus forcing the current over the bar in such a manner as to wash it away. The committee of the St. Louis (Mo.) Merchants' Exchange on Mississippi River Improvement will urge that a trial be made of this scheme.

The canal connecting Brussels with the River Scheldt is to be enlarged so as to permit the passage of vessels of 2,000 tons to the wharves of the capital. The estimated cost is $7,000,000, of which sum Brussels is to give $2,800,000; Belgium, $2,000,000, and the provinces, $800,000; the remainder is to be subscribed by the communes about Brussels. At the end of 99 years the canal is to become state property.

The improvement of Philadelphia harbor is progressing rapidly, according to the late report of General Craighill, Chief of Engineers, U. S. A. During the last fiscal year 4,597,365 cu. yds. of material were dredged from Smith's and Petty islands and the adjacent shoals, and 719,526 cu. yds. of this material were deposited on League Island in improving the naval station there. Smith's and Windmill islands have been removed, and there is now a depth of 18 ft. at low water, and the north side of Petty Island has been cut away, so as to make the average low-water width of the Pennsylvania channel 1,700 ft. General Craighill estimates that at least 2,700,000 cu. yds. will be excavated and removed during the present year, and that the sum of $1,159,000 will complete the existing project.

The gaging of the St. Lawrence River is to be undertaken by the engineering students of McGill University, the alleged purpose being the securing of data upon which to base an estimate of the effect upon that river of the drainage operations at Chicago. The St. Lawrence is now said to be about 4 ft. below the level of last year at the same date.

The New York Dock Board, in connection with a proposed system of localizing classes of shipping, has resolved to provide a basin for the exclusive use of canal boats, between 52d and 54th Sts., on the North River. The general purpose is to secure the greatest possible facility, economy, and convenience to shippers and passengers for all classes of vessels, and incidentally to secure greater safety in the navigation of the harbor. In the case of the canal boat basin referred to, the Board believes that the advantages offered will soon remove all necessity for rounding the Battery with long towa. The new basin is adjoining to, and an extension of, the present canal-boat basin on the North River.

A deep-sea sounding of 4,900 fathoms, or about six miles, was found by the English survey steamer "Penguin" off the coast of Japan in the Pacific Ocean. At that depth the wire broke without indicating bottom. A previous attempt at the same place was followed by a similar accident at 4,300 fathoms. The deepest previous sounding is said to have been 4,655 fathoms.

The survey of the 39th parallel of latitude across the North American continent, commenced in 1871, has been recently completed by the U. S. Coast and Geodetic Survey. The triangulation now extends from Cape May, on the Atlantic coast, to Point Arena, on the Pacific. The two surveys practically met on Pike's Peak.

A single telephone wire is stretched across Lake Wallenstadt, in Switzerland, a distance of 7,872 ft. between the two supporting towers. On the Quinten side of the lake the top of the tower is 1,180.8 ft. above the level of the lake, and on the Murg side the wire starts at a point 426.4 ft. above the water. The wire is made of the best quality of steel, and is only 2 mm. in diameter. The versed sine of the arc made by the wire, is only 623.2 ft., or less than 1-10th of the span, and the lowest point of the wire is still 131.2 ft. above the surface of the water.

The circle of "12 miles radius from New Castle Court House," forming the northern boundary of the state of Delaware, has been rerun by the U. S. Coast and Geodetic Survey. Mr. W. C. Hodgkins, the assistant in charge, gives a historical account of this boundary in Appendix No. 8, Report for 1893 of the U. S. Coast and Geodetic Survey, and also the detail of his own survey. Mr. Hodgkins finds that the whole of the Delaware and Maryland boundary is outside of the true 12-mile circle by 108 ft., or 110 ft. more than the value given to this radius by Colonel Graham in his survey of 1849.

A decision in the air-brake patent litigation which has been for some years in progress between the Westinghouse Air Brake Co. and the Boyden Brake Co., of Baltimore, was handed down by the U. S. Court of Appeals at Richmond, Va., Nov. 11. The Boyden Co. was sued for infringement of claims 1, 2 and 4 of the Westinghouse patent No. 360,070, and the U. S. Circuit Court on March 11 last handed down a decision declaring the infringement of claim 2, but denying the infringement of claims 1 and 4. (Eng. News, March 14, 1895, p.171.) The Court of Appeals has now reversed this decision so far as the infringement of claim 2 is concerned, and releases the Boyden Co. from the injunction ordered by the lower court. The decision just filed appears to have been largely based on the procedure of the U. S. Patent Office in granting a patent to Boyden Aug. 16, 1892. We are informed that the Court said in reference to this:

> Is a subsequent patent granted by the patent office for another and different invention, but which produces the same result as an earlier patent, entitled to as much respect and consideration on the part of the court as the earlier patent? This question was presented necessarily to the patent office of the United States when Boyden applied for a patent for the device under consideration. That office employs the best experts in mechanics which it can secure in this and other countries. Its examinations are, indeed, ex-parte in form, but they are, nevertheless, conducted under hot and skilled contestation in every case of importance, and its decisions, though not conclusive, are entitled to great respect. That office, after full examination, awarded a patent to Boyden on the 16th day of August, 1892, and thereby ruled that the Boyden device did not infringe Westinghouse's quick-action patent No. 360,070. That ruling takes rank here as the testimony of experts of the highest experience, skill and knowledge in mechanics.

The practice of the sleeping car companies in charging the same rates for upper and lower berths, in spite of the fact that the former are usually considered the less desirable, has been the cause of much complaint on the part of the traveling public, and it is reported that the passenger department of the Pennsylvania R. R. is at the head of a movement to secure a more reasonable arrangement. Under the present plan there is always objection made if a lower berth cannot be had; but if the upper berths were cheaper, passengers who desired to economize would naturally prefer them, and this would tend to fill up the car more uniformly. In view of the continuance of high (and sometimes unreasonably high) rates for sleeping car accommodations, in spite of the gradual decrease in railway rates, there seems to be no good reason why some modifications should not be made by the sleeping car companies, which have, as a rule, larger average receipts per passenger than the railway companies. At present the sleeping car rate from New York to Chicago is $5, and this does not include meals, although the sum is enough to pay for room and meals for a day at a first-class hotel, but it is suggested that a charge of $5 for a lower berth and $3.75 (or 25% less) for an upper berth would be a more reasonable arrangement.

The reorganization of the Erie Railroad Co. is taking place, and the new board of directors have elected the following officers: President, E. B. Thomas; Third Vice-President, Andrew Donaldson; Fourth Vice-President, G. G. Cochran. The offices of First and Second Vice-Presidents are yet to be filled. The capital of the new company is $146,000,000, with $30,000,000 in first preferred stock, $16,000,000 in second preferred stock, and $100,000,000 in common stock. The company is authorized to create a mortgage to secure $35,000,000 prior lien bonds, and $140,000,000 general lien bonds. The new company will own and operate the New York, Lake Erie & Western system, the New York, Pennsylvania & Ohio, and the Chicago & Erie railways, a total of about 2,000 miles. The new company has paid into the treasury of New York an incorporation tax of $182,500. This is the largest incorporation tax ever paid in this state by a single corporation.

The Manhattan Elevated Railway report for the year ending Sept. 30, 1895, shows a very considerable reduction in earnings and passenger traffic, as compared with the previous year. The gross earnings for the last year were $9,745,926, a decrease of $392,217; the operating expenses were $6,132,827, an increase of $37,270; and the net earnings were $3,613,099, representing a total decrease of $429,487. The passenger traffic of 1895 was 179,234,356 for the Manhattan system, and 8,838,289 for the suburban branch, as compared with 190,669,854 city, and 5,489,460 surburban, in 1894. The grand totals for 1894 and 1895 were 188,072,645 and 196,159,323, showing a loss of $8,086,678 for the year ending Sept. 30, 1895. Much of this loss in passengers and earnings is ascribed to the competition of the surface cable lines, which have been in operation in the year covered by the report.

A railway viaduct, 175 ft. high and 1,000 ft. long, is to be built by the Central R. R. of New Jersey over the Little Schuylkill River, in the coal regions of Pennsylvania. The contract for construction has been let to the Phoenix Bridge Co., of Phoenixville, Pa.

The New York & Long Island Bridge Co. proposed to operate a railway across the bridge commenced by them over the East River. The General Term of the Supreme Court, through Judges O'Brien and Parker,now declares the act permitting such use of the structure to be unconstitutional. It is held that the act of 1892, providing for a bridge and for an elaborate system of approaches extending to and across the Harlem River, offends against Article 3 of the state constitution, which says that no private or local bill shall embrace more than one subject, and that shall be expressed in the title. The title of this bill only calls for a bridge across the river, and no reference is made to indefinite lateral extensions or "approaches" authorized in the body of the bill. Judge Van Brunt gave a dissenting opinion, that the act of 1892 fully authorized all that the company proposed to do.

The Youghiogheny River bridge at Fifth Ave. and High St., McKeesport, Pa., was opened Nov. 15. There are three spans, 185 ft., 325 ft., and 165 ft. long, with approaches 162 ft. long. The middle span is 55 ft. above the water. The masonry was built by Jutte & Foley, of Pittsburg, and the superstructure by the Pennsylvania Bridge Co.

The New York Rapid Transit Commission has officially applied to the General Term of the Supreme Court for the appointment of three commissioners to determine and report whether or not the adopted plans of the Commission are feasible and whether such a road should be constructed and operated. Burrill, Zabriskie & Burrill, representing owners of $5,000,000 worth of property on Broadway, opposed the appointment of the commissiones referred to, on the grounds of unconstitutionality of the act, under the reading of the new constitution, which prohibits the legislature from passing a private or local bill granting to any corporation or individual the right to lay railway tracks. Mr. E. M. Shepard, for the Rapid Transit Commission, combatted the claim that the consent of a majority of property owners along the proposed line was absolutely necessary. In lieu of such consent, the law provided for the appointment of the three commissioners who were finally to decide this point. Judge Van Brunt decided to appoint the commissioners and defer the constitutional question until later.

The specifications for brick paving adopted by the city of Peoria, Ill., for the coming year's work are unusually complete. The foundation is to be 6 ins. of concrete, composed of 1 part natural cement, 1½ parts sharp sand, and 4 parts broken stone concrete, covered with a 2-in. cushion of sand. The size of the bricks is to be 2½×4×8 ins., or 3×4×9 ins., and they are required to withstand the following tests: (1) a transverse test flatwise, in which they shall show a modulus of rupture of 2,200 lbs. per sq. in.; (2) an absorption test, in which, after 48 hours' immersion, they shall show an absorption of not more than 2% of their own weight; (3) an abrasion test, in which 12 bricks are placed in a cylindrical rattler, 24 ins. by 3 ft., with 300 lbs. of smoothly-worn scrap iron, in pieces varying from ¼ lb. to 5 lbs. in weight, and revolved one hour at 15 revolutions per minute, after which the loss by weight for the smaller brick is to be not more than 9% and of the larger brick not more than 7%. The cement is to be tested for fineness, time of setting, soundness and tensile strength. In the pavement the bricks are to be set on edge in rows running transversely across the street, except at street intersections, where the rows shall make an angle of 45° with the curb lines. After laying, the bricks are to be settled by a roller weighing not less than 250 lbs. per lin. in., or by tamping by a 60-lb. rammer on a 2×12-in.×12-ft. plank. The joints are to be filled with sand.

The lowest bids for asphalt paving ever received by the city of Brooklyn were submitted on Nov. 15. The price named by the lowest bidder was $1.17 per sq. yd., above the foundation. This bid was submitted by Cranford & Co., for eight of the nine streets advertised, comprising a total of 51,833 sq. yds. The lowest bid for the ninth street advertised was $1.25, submitted by the Brooklyn Alcatraz Asphalt Co. The bid of Cranford & Co. on this street was $1.50, and the amount of work involved was only 708 sq. yds. The same price was named by Cranford & Co. for asphalt on cobblestone, comprising over half the area to be paved, as for that on concrete. For repairing the cobble pavement before laying the asphalt, Cranford & Co. bid 20 cts. per sq. yd., and their price for concrete foundation was $4.20 per cu. yd. The kind of asphalt called for is not stated in the information at hand, but the names of some of the bidders would seem to indicate that no special product was named. Mr. N. P. Lewis is Engineer of Local Improvements for Brooklyn, and we are indebted to him for the above facts.

Immigration, during the year ending June 30, 1895, reached the lowest level since 1879. The total of immigrants arriving was 258,536, or 27,000 less than in the preceding year.

A car-cleaners' washing brush, invented by Mr. Edward Murphy, Division Superintendent of the Great Western Ry., of England, has a hollow handle and a perforated head. A hose connects the handle with a water-pipe or stand-pipe, and the water flows through the brush, the amount being regulated by a cock on the handle. In the upper part of the head of the brush is a box for holding soap, cleaning powder, etc., and the water can be discharged through this at will. The brush is applicable for washing cars, store windows, etc.

For the preliminary surveys and plans of the new botanical garden, to be established in Bronx Park, New York city, the Board of Estimate and Apportionment has voted an issue of $25,000 in bonds. The sum of $500,000 is appropriated for this work, but the Board deems it wise to have some specific plans to study before the whole issue is made.

BOOK REVIEWS.

CAR LUBRICATION.—By W. E. Hall, B. S., M. E. Second edition. New York: John Wiley & Sons. Cloth; 12mo; pp. 73; illustrated; $1.

This is the second edition of the compact and practical work of which we published some extracts on June 27, 1891. In the preface to this edition the author states that it now looks as though a comparatively hard white metal in shells of iron or hard brass, would be finally adopted as the best bearing metal. The subject is considered from practical and theoretical points of view, and there is an appendix giving some French experiments on the lubrication of car axle bearings.

EXAMINATION OF WATER for Sanitary and Technic Purposes. By Henry Leffmann, A. M., M. D., Ph. D., Professor of Chemistry in the Woman's Medical College of Pennsylvania, etc., etc. Third Edition, Revised and Enarged, with Illustrations. Philadelphia: P. Blakiston, Son & Co. 12mo; pp. 154; $1.25.

The present edition of this book has been revised at some points and enlarged at others in order to include recent "modifications of the details of processes of sanitary analysis as developed by various American workers." The book is written almost wholly from the chemical side of the subject, but some space is devoted to biological examinations. Dr. Wm. Beam, whose name appeared on the title page of the earlier editions, has transferred his interests in the book to Dr. Leffmann, on account of having taken up a permanent residence outside of this country.

WHAT AN ENGINEER SHOULD KNOW ABOUT ELECTRICITY. By Albert E. Clough, E. E. Also the Rules and Requirements of the Underwriters' International Electric Association, for the Installation of Electric Light and Power. Boston, Mass.: The Mason Regulator Co. Small 12mo; paper; pp. 108; 50 cts.

This little book is No. 4 of the Mason Regulator Company's series. It contains about as much as can be expected for the price. A better name for it would be: "A Few of the Things an Engineer Should Know About Electricity." It also contains a brief account of batteries and battery currents, and their application to electric bells, burglar and fire alarms, and electric gas lighting; also a description of the dynamo, and a well-written chapter of 14 pages on "Care of the Dynamo." Incandescent and arc lighting, the transmission of power, and the storage battery, are treated briefly. The Underwriters' rules occupy 28 out of the 108 pages of the book.

STEAM AND THE MARINE STEAM ENGINE. By John Yeo, Instructor in Steam and Marine Engineering, Royal Naval College, etc. Macmillan & Co., London and New York. 8vo; cloth; pp. 196; 105 illustrations; $2.50.

This book has been prepared from the lecture notes of the author, and represents a part of the course of instruction for executive officers at the Royal Naval College. It is intended for naval officers and for students of engineering in the earlier part of their training. The aim of the book is to give a general knowledge of the subject, with as much detail as appears necessary for

the end in view, in as brief and simple a manner as possible. It is not to be expected that the subject of steam and the marine steam engine can be fully treated in a work as concise as the one before us, but, as far as it goes, it appears to be an admirable work for beginners in the study of marine engineering. The text is very clear, and the illustrations excellent.

THE MODERN MACHINIST: A Practical Treatise on Modern Machine-Shop Methods; describing the most approved methods, processes and appliances employed in present practice for cutting, shaping, fitting, erecting and finishing metalwork, on the vise, floor, lathe, planing, shaping, slotting, milling, drilling, grinding and other machines.—By John T. Usher. New York: Norman W. Henley & Co. 8vo; cloth; pp. 320; 257 illustrations; $2.50.

The comprehensive sub-title above quoted gives a fair idea of the scope of this work. The author has omitted the usual descriptions of the ordinary machine tools, and the cutting tools used therewith, and has devoted his space instead to the means actually employed for performing the operations on various classes of work in many prominent shops. The illustrations, which are entirely new, are largely perspective views, which makes them clear to the mind of the average mechanic. The work is well written, and we can strongly recommend it to machinists, and especially to young men who are just learning their trade.

A TREATISE ON HYDRAULICS. By Henry T. Bovey, M. Inst. C. E., F. R. S. C., Professor of Civil Engineering and Applied Mechanics, McGill University, Montreal. New York: John Wiley & Sons. 8vo; cloth; pp. 337; illustrated; $4.

This work is intended both for the student and the engineer in general practice. The majority of the examples used to illustrate the text are taken from the experience of the author, while others have been selected from the works of Weisbach, Osborne Reynolds, Cotterill, and writers of similar reputation. The tables of coefficients of discharge have been prepared from special experiments still being carried out in the hydraulic laboratory of the university. The flow of water through orifices and over weirs, fluid friction and the flow in pipes and open channels are fully discussed, with examples under each general head. The various methods of gaging are illustrated and described, and a chapter on impact introduces another describing various forms of hydraulic motors and centrifugal pumps. The treatment is concise and plain, though necessarily somewhat mathematical, and the cuts used to illustrate the text are the clearest and best we have seen in any work on this subject.

MODERN COPPER SMELTING. By Edward Dyer Peters, Jr. Seventh Edition. Rewritten and greatly enlarged. New York: The Scientific Publishing Co. Cloth; 8vo; pp. 642; 85 illustrations and 15 plates; $5.

The present edition of this work is a great improvement upon the earlier editions, having been rewritten throughout and enlarged, so as to contain accounts of all the most recent processes. Since the last revision, the metallurgy of copper has been greatly modified by the general introduction of automatic calcining furnaces, by the extraordinary development of the copper Bessemer process, by improvements in blast furnaces and reverberatories, by electrolytic refining, and by improved methods of handling materials and product. The author is an engineer of wide experience in the smelting of copper ores, and his work is written almost entirely from the practical standpoint, although he deals with the chemical theories of the various processes as far as is necessary. The illustrations contain numerous working drawings of furnaces and other apparatus, and tables of metallurgical results, including cost of operations, are given in great number. The book is handsomely printed. We can commend it as being the standard American work on the subject.

ALTERNATING ELECTRIC CURRENTS. By Edwin J. Houston, Ph. D., and A. E. Kennelly, Sc. D. New York: The W. J. Johnston Co. Cloth; 12mo; pp. 225; 77 illustrations; $1.

This is the first of 10 volumes of an elementary electrotechnical series designed to give concise and authoritative information concerning those branches of electrical science having a general interest. The authors are well-known experts in electrical matters, and, in the present volume, they have made a highly-successful attempt to bring the difficult subject of alternating currents within the comprehension of the general reader who is already possessed of the elementary principles of direct-current work. The several chapters treat of alternating electro-motive forces and currents, uniphase alternators, power transformers, electric lamps, multiphase currents, and multiphase motors.

In their preface the authors say that they believe they are meeting a demand for information on the important subject of alternating currents, which shall at once be reliable and in such form as to be easily understood by those not specially trained in electro-technics. Keeping these conditions always in view, the authors develop the fundamental principles underlying the difficult branch of electrical engineering of which the work treats, in the simplest language, and without the use of mathematics any further advanced than ordinary arithmetic, while the various applications are described in terms as free as possible of technicalities.

The book can be recommended as probably the best book in existence for a beginner on the subject of which it treats. It does not seem as if any more simple and elementary treatment of such an essentially difficult subject could be possible.

BERICHT DES GEWOLBE-AUSSCHUSSES. Sonderabuck aus der Zeitschrift des Osterr. Ingenieur und Architekten Vereines. Vienna. Large 4to; paper; pp. 131; many illustrations in the text and 27 folding plates; for sale in the United States by Fr. Von Emperger, C. E., 71 Broadway, New York city; $2.65.

As many of our readers are aware, the Austrian Society of Engineers & Architects carried out some time ago an exhaustive series of tests of the strength of arches of various kinds, giving especial attention, however, to arches for fireproof floor construction, and arches of combined concrete and steel construction, which have come into such extensive use in Austria and Germany. The full report of these elaborate tests has at last been published, and forms a bulky monograph, bristling with tables and mathematics. The price at which it is published is an exceedingly reasonable one, considering the amount of matter contained; and the work will propably be the standard authority on the strength of arches for many years to come. As the work is, of course, printed in German, it is unavailable to most American engineers; but those who can make use of it will be glad to do so. Its value as a work of reference is such that a copy should certainly be placed in the library of every engineering society.

THE TRANSPORTATION EXHIBITS AT THE WORLD'S COLUMBIAN EXPOSITION OF 1893.—By James Dredge. London, 1894: "Engineering"; 4to; cloth; pp. 779; 405 illustrations in text and excii. folding plates; $15.

Anything like so complete a record of the transportation exhibits at the Columbian Exposition as this volume affords has not been printed before, and doubtless will never be until the official history of the exposition appears some time in the dim future. The author, Mr. James Dredge, editor of London "Engineering," has brought to the work a wide knowledge of the subjects about which he writes, and his training as a journalist has enabled him to seize upon the salient features from the engineering and mechanical point of view and present them in a most concise and readable form. It is impossible here to touch upon more than the most prominent features of the book, but a general idea of its scope may be obtained from the main headings into which its contents are divided. These are: History and Description of Buildings, 56 pages; Transportation Building, 18 pages; Electric Lighting and Power Engines, 24 pages; Locomotive Exhibits, 224 pages; Historical Locomotives, 36 pages; Passenger Cars and Rolling Stock, 137 pages; Ship Models, 129 pages; Ordnance, 47 pages; Miscellaneous Exhibits, 96 pages. The descriptions of the construction, operation, efficiency, etc., of each machine are written for the engineer, and in all important or typical machines these descriptions are accompanied by detail drawings, and what is more important, give dimensions in detail. Probably 80% of the illustrations are these detail drawings.

The book is printed on heavy plate paper, and the line drawings, woodcuts and half-tones are generally handsomely engraved and printed. In all respects the volume will form a valuable and handsome addition to an engineer's library, not only for its complete record of transportation exhibits at the exposition, but for the technical value of its contents. The agent for the sale of the book in the United States is H. V. Holmes, Lakeside Bldg., Chicago, Ill., to whom all orders should be sent.

THE HOUSING OF THE WORKING PEOPLE. Eighth Special Report of the Commissioner of Labor. Prepared under the direction of Carroll D. Wright, Commissioner, by E. R. L. Gould, Ph. D. Washington, D. C., 1895. Octavo; 461 pp. and many illustrations.

After briefly reviewing the scope and character of this inquiry, the author discusses sanitary laws, and gives the laws in force in New York city, and in England, France, Germany and Belgium, and, in this connection, treats of the expropriation of land for sanitary purposes, as applied in various European centers. In showing the importance of caring for the sanitary needs of the working class, Mr. Gould mentions that the tenement houses of New York have increased in number from 18,582, in 1867, to 37,358 in 1891. First-class apartment houses are not included in this statement, and the houses classed above sheltered 276,565 families, in 1891, or a total population of 1,225,451, including 160,708 children under five years of age. Thanks to the exertions of the New York Board of Health, the average death-rate per 1,000, taken in periods of five years, for the whole population, has decreased from 29.81, in 1866-1870, to 25.52 in 1886-1890. While the latter rate is not considered bad, London and Edinburgh have done better still. Edinburgh, in 1865-1874, had a rate of 26.26 per 1,000; in 1885-1890 this had been reduced to 17.51, while London has a present death-rate of about 20.5 per 1,000. It is claimed that a considerable share of the improvement in Edinburgh is due to the destruction of old and thickly-settled centers of population, and the rebuilding of these sections by the improvement trust. In Brussels the death-rate from infectious diseases, between 1864 and 1890, was reduced from 3.03 to 1.31 per 1,000, by similar pulling down and rebuilding. After further statistics on the above heads, the author devotes the great bulk of this report to illustrated descriptions of model homes for working-men, and to actual structures of this type erected in the great cities of the world. In this connection, there will be found scattered through the text many valuable suggestions taken from foreign practice, especially those regulations tending to prevent the overcrowding of houses on a given space. To prevent too rapid occupation of the suburbs of a city, for example, Berlin law forbids all building upon unsewered ground within certain corporate limits. The illustrations in this section of the report are very numerous and complete.

THE MINERAL INDUSTRY, Its Statistics, Technology and Trade in the United States and Other Countries to the End of 1894. Vol. III. Edited by Richard P. Rothwell, Editor of the "Engineering and Mining Journal," etc. New York: The Scientific Publishing Co. Large 8vo; pp. 770; many tables; $5.

The object of this annual publication is thus expressed in its preface: "To collect and put in convenient form all the reliable statistics of the mineral industry of the world, to collect more promptly and more accurately than had hitherto been done the mineral statistics of the United States, and to photograph, as it were, the condition of the industry from year to year, bringing out into boldest relief that information which has the greatest practical value in the development of the industry, and which is not easily accessible. The accumulation of the necessary data concerning the past, and the elucidation of the conditions which affect the growth and wellbeing of a great industry, constitute an enormous undertaking." That the ambitious project of producing an annual involving such a vast amount of labor and having such a wide scope has been eminently successful is evidenced by the fact that the enterprise has now reached its third year, and the book which is now before us is at least equal to any of its successors. No less than 36 contributors have assisted in its preparation, and their photographs, with brief biographical sketches, are given in the introductory pages. The statistics of the 10 leading commercial metals and of 60 non-metallic minerals for 1894, with comparison of figures for from one to four preceding years, are given, together with numerous articles on the course of trade of these several products. A large part of the volume is given to technical articles, some of which are reviews of recent progress, and others are extensive monographs on metallurgical processes, which are actual treatises on the subjects described, and are in no sense annual reviews. Some of the principal technical articles are the following:

"Abrasives," by E. G. Acheson, 20 pages, including carborundum, corundum and emery, infusorial earth and tripoli, rouge, steel emery and crushed steel; "Alum and Sulphate of Alumina," by John Enquest, 46 pages; "Electrolytic Methods of Alkali Manufacture," by Titus Ulke, 5 pages; "Some Improvements in the Manufacture of Sulphuric Acid," by W. H. Adams, 10 pages; "Electrolytic Copper Refining," by Titus Ulke, 16 pages; "Some Recent Improvements in the Metallurgy of Copper," by E. D. Peters, Jr., 41 pages; "The Phosphates of Tunis and Algeria," by D. Levat, 16 pages; "The Amalgamation of Free Milling Gold Ores," by L. Janin, Jr., 45 pages; "Lake Superior Iron Ore," by J. P. Channing, 27 pages; "Treatment of Argentiferous Lead Ores," by H. O. Hofman, 24 pages; "Notes on Electro-Plating," by Titus Ulke, 7 pages.

It seems to us questionable whether papers of the value of some of these should not rather be contributed to the transactions of technical societies, where they would be more certain of reaching a larger audience and of being permanently preserved, than to a bulky annual, where they are apt to remain hidden amongst the vast mass of statistical data by which they are surrounded. There is one article especially in the volume which it would be well to republish in pamphlet form. It is on gold and silver, 30 pages, unsigned, but no doubt from the pen of Mr. Rothwell himself. In this article the silver question is discussed from the statistical standpoint, and conclusions are reached in favor of bimetallism which are worthy of the consideration of every student of the subject.

A TEXT-BOOK OF THE MECHANICS OF MATERIALS, and of Beams, Columns and Shafts. By Mansfield Merriman, Professor of Civil Engineering in Lehigh University. Sixth ed., enlarged. New York: John Wiley & Sons. Cloth; 8vo; pp. 368; $4.

The present edition of Professor Merriman's work contains double the matter of previous editions. The first half of the book, chapters I. to VII., inclusive, constitute an elementary course, and the remainder is new, and suitable for an advanced course. Some of the subjects treated in the new portion are: Fatigue of materials, repeated stresses, resilience, impact, centrifugal stress, shrinkage of hoops, spherical and cylindrical

rollers, eccentric loads, stresses in guns, etc. Among the many American treatises on the subject of the mechanics of materials, the present work ranks as one of the very best. The author writes with exceptional clearness, and seems to continually bear in mind the necessity of giving numerous practical examples to the student, and not depending too much on his mathematical faculty, which, as a rule, is but imperfectly developed. The work is thus made valuable, not only to the college student, but to the engineer in practice, who is very apt to be rusty in his higher mathematics, and desires facts and conclusions, rather than the ingenious methods by which they are derived. The confusion of terms by which the words "strain" and "stress" are used ambiguously by many writers, is avoided by the author, by defining stress as "a force which acts in the interior of a body, and resists the external forces which tend to change its shape," and by using "strain" only once in the whole book, in the following sentence:

> The word "strain" is often used in technical literature as synonymous with stress, and sometimes it is also used to designate the deformation, or change of shape. On account of this ambiguity, the word will not be employed in this book.

We hope that other writers will follow Professor Merriman's example, at least to the extent of not using "strain" as synonymous with "stretch," as many have done (see editorial in our issue of June 23, 1892).

Professor Merriman also avoids all controversy about the terms "elastic limit" and the more recent "yield-point," by not mentioning the latter term at all. Much "fatigue" would have been saved if this term had never been introduced into the language.

The chapter on "Resilience" is especially valuable, not so much on account of the extent of the information it contains as for calling prominent attention to this quality of materials, which has been too little studied in the past, and upon which our knowledge is only fragmentary. The author points out the necessity of further experimental work on the subject. His words concerning the paradoxes of resilience are worth quoting, and we commend them especially to those whose bent is more toward mathematics than toward experiment.

> These unnecessary paradoxes and misunderstandings can be dispelled only by a clear conception and correct application of the fundamental laws of mechanics. The definitions of force and stress, work and energy, and all the words employed, must be clearly understood, and the law of conservation of energy be made the basis of every step of the reasoning. Too much attention cannot be given in our technical schools to the elucidation of these fundamental conceptions, in view of the lack of precision which is so frequently apparent. . . . Language is ofttimes an imperfect instrument for communicating thought, and algebra usually beclouds the reasoning, whose tool it is. Hence, perhaps, these fundamental conceptions may be better fixed in the minds of students by practical experiments and numerical computations, than by the mere study of books and the solution of algebraic exercises. The laws of mechanics are the laws of experience, and the best knowledge of nature is the solid ground of direct interrogation and investigation.

We find a few minor defects in this otherwise admirable book, which, perhaps, may be remedied in future editions. Formula (4) and laws A to E, and F G, are frequently referred to without stating either page or section where they may be found. It took us quite a while to discover that laws A and B were on page 6, F and G on page 48, and formula 4 on page 51. Barlow's formula for thick cylinders is given on p. 28, and Eames' formula on p. 310. The formulas are very different in their form, and the examples under each are quite different. There is nothing to show what results would be given for the same problem by the two formulas, and which one should be preferred in any special case.

Those acquainted with the earlier editions of Professor Merriman's book will be pleased to know that the blank pages which were a prominent feature in them are in the present edition filled with reading matter. The typography, paper, binding, etc., are of the usual excellence of Messrs. Wiley & Son's college text-books.

MUNICIPAL GOVERNMENT IN CONTINENTAL EUROPE. By Albert Shaw, author of "Municipal Government in Great Britain." New York: The Century Co. 8vo; cloth; pp. 505; $2.

This second work of Dr. Shaw is even more interesting than his first, in its wider range of practice in municipal government and clear presentation of the varying influences under which this government has been developed upon the Continent. Dr. Shaw takes Paris as the typical modern city, and well proves the influence that French methods have had in making other modern cities in Europe. Few people realize how rapid has been the growth of Paris, or the full meaning of the civic revolution which has transformed it from a crowded, dirty and unhealthy city of 600,000 inhabitants, in 1789, to the magnificent metropolis of to-day, with a population closely approaching 3,000,000. The famed sewerage system of Paris, about which so much has been written, instead of being of considerable antiquity, as many suppose, practically dates from 1860; and the magnificent boulevards and wide and well-paved streets, that greatly assist in making Paris what it is, owe their origin to the wisdom of Napoleon III., and to the boldness and practically unlimited power of Baron Haussmann, between 1852 and 1871, and to the equally efficient efforts of his successor, M. Alphand, between 1875 and 1893.

Dr. Shaw tells us how this improvement was accomplished, and enters into the full detail of the municipal organization which maintains and still carries on the work commenced. Paris has a chamber of 80 councilors, elected by popular vote, and this council elects its president; but there is no mayor in the sense that we use that term. The real rulers of Paris are the Prefects of the Department of the Seine and of Police, officials appointed by and holding office under the general government, and completely controlling a great administrative organization. While this control is not according to our ideas of republican institutions, measured by methods and results, it must be confessed that it has its advantages. For example, American city fathers congratulate themselves on having made an extraordinary bargain when, in return for privileges granted to gas companies, they have their streets and public buildings lighted at cost. Paris obtains not only this concession, but $4,000,000 each year in addition to it, besides controlling the price paid by the citizens for light, and compelling the companies to divide with the city all profits above the liberal dividend of 13½%. But the companies are also prevented from watering their stock, and are not allowed to increase their capital above the present amount—$16,800,000. Within the past 10 years the Paris Gas Co. has paid into the city treasury $40,000,000. The government owns all the telegraph and telephone wires, and disposes all of them under ground, in subways or in the sewers. Electric-light cables are disposed of in a similar way, and while the city has granted to various electric light companies the concessions for lighting certain fixed "secteurs" of Paris, the city always controls the situation by building and owning a central electric installation of its own, and retaining the right to run its cables in any conduits laid in any section of the city. The organization for the construction and maintenance of streets, and for the removal of refuse and garbage, is wonderfully disciplined and complete. While the abutting owners pay for the great bulk of original street construction, the maintenance and renewal of the streets are ever after a public charge, controlled by the city's chief engineer and his staff of highly-trained technical experts. The municipality works its own quarries for a large proportion of the paving blocks it uses, and lays them; and as the officials and engineers have learned precisely how to lay and maintain wooden pavements, what they cost, and how long they may be expected to last in different classes of streets, they now find it advantageous to construct such pavements without the intervention of a contractor. The administration has also commenced to lay down its own asphalt pavements, and it finds that it can keep them in constant repair at less cost than is paid to private companies. Garbage and street sweepings are removed by small contractors, the object aimed at being the utilization of the farmers and gardeners in the immediate vicinity of Paris for this service. They remove the garbage and sweepings on their return trips to the country, and use them as fertilizers, etc., a disposition only possible, it may be mentioned, in clean Paris, and under the methodical supervision of the bureau in charge of this work, which provide all the labor for loading the farmer's cart, and directly supervise every detail.

Between 1856 and 1895 Paris has expended nearly $50,000,000 upon its water supply. In 1860 the municipality acquired a peculiar control over the water supplied to the annexed districts. At that date the private company in charge turned over to the city all its property and rights, and in return was given a 50-years' interest in the proceeds of the water business. It was made the city's collecting agent and intermediary in all dealings with private individuals, and was allowed a commission of 25% upon annual collections, up to $1,200,000, with a decreasing percentage above that sum down to 5% on all collections in excess of $2,400,000. The company has nothing to do with the water supply for public use, construction, or the fixing of rate schedules. This is attended to by the city, but the company makes house connections and attends to domestic details, and the rates are so fixed that it is made an active opponent of waste. After 1910 the city of Paris will own and control the water supply in all its details. At the present time the revenue to the city from private users of water pays the interest and sinking-fund charges upon the total investment in water supply, and leaves some profit besides. In the disposal of household waste by the sewers, Paris is behind the times, and is now expending some millions in reconstructing and adapting her sewerage system on the "tout a l'egout" plan. House connections were first made with certain sewers in 1886, and in 1892 such connections were made obligatory wherever the sewers could be adapted to it. As showing the necessity for such action, and the extent to which the change is being made, it is only necessary to say that in 1871 there were more than 80,000 cesspools in Paris. It is expected that this number will have been reduced to 50,000 by 1896. The density of population in Paris is shown by the fact that 2,500,000 people are concentrated on 30 sq. miles, an average of 83,000 per sq. mile, as contrasted with 34,000 per sq. mile for London, with its area of 123 sq. miles, and 4,230,000 inhabitants, in 1891. Dr. Shaw enters into the history and development of Paris street traffic, building regulations, sanitary precautions, the markets, public charity, schools, municipal debt and loans, and in a long chapter describes the general features of the French municipal system. This he follows with notes upon the municipal systems of Belgium, Holland and Spain, and upon recent progress in Italian cities.

The framework of the German city government is strongly influenced by the scientific spirit and method, as Dr. Shaw terms it, a result of the German habit of thoroughness in research and of patient, exhaustive treatment of any work in hand. The recent growth of German cities in population has been phenomenal, and how much of this growth can be ascribed to the wise provisions made for it by German engineers can only be guessed at. Berlin alone has grown from 800,000, in 1870, to 1,578,794 in 1890; Hamburg has gained more than 200,000 in 15 years, and Leipsic, 228,000 in the same time. The suburban tendency is the key to recent municipal development everywhere, and in Germany this tendency is fully recognized, and street systems are being rapidly adjusted to meet the demands for quick transit to these suburbs. Instead of the American checkerboard plan of laying out streets, the German system is a combination of the radial and concentric with the rectangular and parallel, a combination which is well known to be much more convenient. Good street pavements are insisted upon, at any cost, and Berlin adopted asphalt as a paving material more than 20 years ago, and is rapidly extending its use, though most of the city is still paved with stone blocks. In further recognition of the tendency of population toward the suburbs, the German cities are now taking measures to control the form of their expansion, and the annexation of outlying territory is the order of the day. The convenient entrance and exit of railways is especially studied, as of vital importance to commercial prosperity. Existing waterways are being improved and utilized with the same ends in view. While there is local self-government in Germany, these local organizations are under the general control of officers representing the German government, who foster order and uniform system in the conduct of local affairs. Stability in municipal councils is maintained by making the terms of different members expire at different times, and the councillors, as a rule, are excellent citizens and educated men, and membership in the council is considered a high honor. No salaries are attached to the office, and penalties are imposed for refusal to serve, if elected.

The burgomaster and magistrates, who are the real rulers, are the most highly trained experts that a German city can procure. The burgomaster must be an expert in the art of municipal administration, and associated with him in the magisterial council are experts in law, in finance, in engineering, in education, sanitary science, public charity, forestry, and in the technical and business management of water and gas supply, etc. It is not, as with us, simply a body of representative citizens, who are ignorant of the business of city government, no matter how worthy as individual citizens. The German system implies, and is founded upon a system of professional civil service, which it is difficult for an American to appreciate in its full significance. For example, the burgomaster himself is very often called from some smaller city, where he has made his reputation as a burgomaster, or mayor, just as the late mayor of Berlin made his reputation at the head of the municipality of Breslau. Of the 34 members of the Berlin magistracy, 17 are salaried, appointed for 12-year terms, and are selected from the civil service of other German cities where they have made a record. They include all the technical or professional experts, and it is understood that they will be re-elected as long as they faithfully and efficiently perform their duties. They practically hold office for life. The other 17 members of the magistracy are elected for six years, and serve without salary. But they represent the highest development of non-professional skill and experience in municipal affairs. They are usually citizens with sufficient leisure and means to devote their time to the city from motives of public spirit, and for the high honor of the position. These unpaid places are also usually permanent, though transfers are sometimes made to the salaried list as vacancies occur. The mayor of a German city is the head of and the general manager of the whole mechanism of administration.

Space forbids going deeper into this very interesting work of Dr. Shaw, which is the most complete and satisfactory treatise upon the modern municipal methods of European cities that has ever appeared. We can only add that he concludes his book with chapters on the sanitary reforms of Hamburg, the transformation of Vienna, and the new metropolis of Budapest.

CONTENTS OF SUPPLEMENT.

PERSONALS..... 165
ENGINEERING SOCIETIES..... 165
Coming Technical Meetings..... 165
NEW PUBLICATIONS..... 165
Trade Publications..... 165
CONSTRUCTION NEWS:
List of Contracts Pending..... 166
Railways..... 166
Street and Electric Railways..... 167
Electric Light and Power..... 167
Bridges..... 168
Buildings..... 168
Water-Works..... 168
Irrigation..... 169
Sewerage..... 169
Garbage Disposal..... 170
Streets and Roads..... 170
Manufacturing Plants..... 170
Miscellaneous Contracts and Supplies..... 170
Contract Prices..... 170
Metal Market Prices..... 171
INDUSTRIAL NOTES..... 171

PERSONALS.

Mr. J. M. Crampton, a well-known chemist, died in New York city on Nov. 15.

Mr. A. M. True has been appointed Superintendent of the Canton, O., Water-Works.

Mr. Henry G. Ashton, inventor of the Ashton safety valve, died at Somerville, Mass., on Nov. 12, at the age of 49.

Mr. Alfred L. Tubbs, President of the Tubbs Cordage Co., has been elected a director of the Southern Pacific Ry. Co.

Col. Michael Shoenmaker, one of the contractors who built the Illinois & Michigan Canal, died on Nov. 10 at Jackson, Mich.

Mr. Chas. C. Brown, formerly City Engineer of Indianapolis, Ind., has opened an office as consulting engineer at 19½ N. Penn St., Indianapolis.

Wm. H. Breithaupt, M. Am. Soc. C. E., has opened an office as a consulting engineer at 71 Broadway, New York city, and will give especial attention to general structural work.

Mr. F. W. Bruce has been appointed City Engineer of St. Augustine, Fla. Mr. Bruce has just prepared plans for a system of water-works for the city, estimated to cost $67,302.

Mr. John D. Wilson, a prominent Indiana contractor and formerly Superintendent of Bridges on the Pennsylvania Ry., Western Division, died on Nov. 13, at Valparaiso, Ind., aged 66 years.

Mr. G. M. Eldridge, Assoc. M. Am. Soc. C. E., has resigned his position as Superintendent of Water-Works and City Engineer of Americus, Ga., and will become superintendent of the water-works of Defiance, O.

Mr. J. E. Rugg, Superintendent of the Citizens' Traction Co., of Pittsburg, has resigned to accept the position of Manager of the West End lines of Boston. The vacancy will be filled by Mr. Chas. Fitzgerald, Chief Engineer.

Mr. Barton Hoopes, a Philadelphia iron manufacturer, died in that city on Nov. 15, at the age of 69. Mr. Hoopes was the founder of the well-known firm of Hoopes & Townsend, which commenced business in Wilmington, Del., in 1849.

Mr. Daniel Howell, who died at Toledo, O., on Nov. 7, saw many years of service as a civil engineer in important Western railway work, and for 20 years preceding his retirement from active duty in 1893, was connected with the Smith Bridge Co.

Mr. L. C. Smith has resigned the superintendency of the Jefferson Division of the New York, Lake Erie & Western Ry., to accept the position of Superintendent with the Delaware, Susquehanna & Schuylkill Ry., with headquarters at Drifton, Pa.

Mr. Benjamin N. Payne, senior member of the engine and boiler manufacturing firm of B. W. Payne & Sons, of Elmira, N. Y., met with a serious accident on Nov. 13. He was thrown from his buggy and struck his head against the curbing, sustaining a dangerous fracture of the skull.

Mr. Samuel Whitney, Assistant U. S. Engineer, stationed at Oshkosh, Wis., as Assistant Engineer-in-Charge of the Fox River Improvement work, has resigned on account of ill health. Mr. Whitney has held his present assignment four years, and has been in the government service 30 years.

Mr. E. P. Bryan, Superintendent of Terminals of the Louisville & Nashville R. R., has been elected General Manager of the St. Louis Terminal Ry., succeeding Mr. Joseph Ramsey, Jr., recently appointed General Manager of the Wabash R. R. Mr. Ramsey becomes General Manager of the Wabash in place of Mr. Chas. M. Hays.

Mr. Jas. C. Clarke has resigned the presidency of the Mobile & Ohio R. R. Co., the action arising from a desire to retire from active business. Mr. Clarke has been actively engaged in railway work since 1844. His connection with the Mobile & Ohio began in 1888. Mr. Clarke will be succeeded by General Manager J. G. Mann.

Mr. John Ranald Macdonell, C. E., who died recently in Montreal,, was born in Lancaster, Ont., in 1821. He went to Georgia in 1848, where he held important positions in survey and construction work on the Savannah, Southern & Florida and other railways, remaining in the South until 1869. He was also engaged as contractor in the building of some of the pioneer railways of Minnesota. In 1868 he accepted an appointment from the Canadian government on the survey and construction of the Intercolonial Ry., and later took an active part in the construction of the Canadian Pacific Ry., from which work he retired in 1885.

Mr. S. G. Reed, the well-known California capitalist, died at Pasadena, Cal., on Nov. 7. Mr. Reed was identified with many enterprises of great importance to the Pacific Coast region. He went to Oregon in 1852, and engaged in mercantile pursuits until 1858. In that year he became part owner of three steamers in the North Pacific Coast trade, which were the beginning of the Oregon Steam Navigation Co., organized in 1860, a most powerful factor in the early development of Oregon. In 1878 the Walla Walla & Columbia River R. R. was purchased and operated by this company. In 1879 Mr. Reed assisted in building the first section of the Canadian Pacific Ry. from Port Moody to Kamloops, in British Columbia. Mr. Reed was President of the Oregon Iron & Steel Co., and had been interested in several mining companies in Oregon and Idaho.

ENGINEERING SOCIETIES.

ENGINEERING SOCIETY OF WESTERN NEW YORK.—At the meeting on Nov. 11, held at Buffalo, Mr. Newcomb Carlton read a paper on "Power Transmission," in which he discussed exhaustively all the modern methods of transmission of power.

WESTERN RAILWAY CLUB.—The regular meeting of the club was held at the Auditorium Hotel, Nov. 19. The paper on "Wide Fire Boxes," read at the October meeting, was discussed, and there was also a topical discussion on "Freight Car Doors and Attachments." The paper of the day was entitled "Air-Brakes and Freight Equipment," and was read by Mr. A. M. Waitt, General Master Car Builder, Lake Short & Michigan Southern Ry.

ENGINEERS' CLUB OF ST. LOUIS.—At the meeting on Nov. 6, Prof. Chas. C. Brown's paper on "The Sewerage of Indianapolis" was read by Mr. B. H. Colby. The paper explained the peculiar features of the problem, and was illustrated by drawings and maps showing the general features, as well as details of the several interesting forms of special construction. The country being flat, little or no fall was available. Mr. Moore gave some further details of the situation, size of streams, etc. The life of ironwork painted with asphalt was discussed. The difficulty of getting good construction in masonry was mentioned, as was also the subject of water pollution and protection of watersheds.

William H. Bryan, Secy.

COMING TECHNICAL MEETINGS.

INDIANAPOLIS ENGINEERING CLUB.
Nov. 23. Secy., C. C. Brown.
WISCONSIN POLYTECHNIC SOCIETY.
Nov. 20. Secy., W. K. Means, Loan & Trust Bldg., Milwaukee.
CIVIL ENGINEERS' SOCIETY OF ST. PAUL.
Dec. 2. Secy., G. L. Annan, City Engineer's Office.
ENGINEERING SOCIETY OF WESTERN NEW YORK.
Dec. 2. Secy., Geo. R. Sikes, 122 Pearl St., Buffalo, N. Y.
AMERICAN SOCIETY OF MECHANICAL ENGINEERS.
Dec. 3-6. Secy. F. R. Hutton 12 W. 31st St. New York.
COLUMBIAN ENGINEERING SOCIETY.
Dec. 3. Secy., W. F. Hart, University Bldg., 15th and H Sts. N. W., Washington, D. C.
WESTERN SOCIETY OF ENGINEERS.
Dec. 4. Secy., Chas. J. Roney, Monadnock Block, Chicago.
ENGINEERS' CLUB OF ST. LOUIS.
Dec. 4. Secy., W. H. Bryan, Turner Block.
AMERICAN SOCIETY OF CIVIL ENGINEERS.
Dec. 4. Secy., C. W. Hunt, 127 E. 23d St., New York.
CANADIAN SOCIETY OF CIVIL ENGINEERS.
Dec. 5. Secy., C. H. McLeod, Montreal.
TECHNICAL SOCIETY OF THE PACIFIC COAST.
Dec. 6. Secy., O. H. Von Gelders, 819 Market St., San Francisco.
ENGINEERS' CLUB OF PHILADELPHIA.
Dec. 7. Secy., L. F. Rondinella, 1122 Girard St.
ENGINEERS' CLUB OF KANSAS CITY.
Dec. 9. Secy., F. W. Tuttle, Baird Building.
CIVIL ENGINEERS' CLUB OF CLEVELAND.
Dec. 10. Secy., F. A. Colburn, Case Library Building.
DENVER SOCIETY OF CIVIL ENGINEERS.
Dec. 10. Secy., H. Breen, 36 Jacobson Block.
NORTHWEST RAILWAY CLUB.
Dec. 10. Secy., G. A. Seley, 80 Metropolitan Block, St. Paul, Minn.
NORTHWESTERN SOCIETY OF ENGINEERS.
Dec. 10. D. W. McMorris, Burke Bldg., Seattle, Wash.
NEW ENGLAND RAILROAD CLUB.
Dec. 11. Secy., F. M. Curtis, P. O. Box 1576, Boston, Mass.
ENGINEERING ASSOCIATION OF THE SOUTH.
Dec. 12. Secy., H. D. Ruhm, Nashville, Tenn.
ENGINEERS AND ARCHITECTS' CLUB OF LOUISVILLE.
Dec. 12. Secy., Jas. K. Zollinger, Norton Building.
NORTHWESTERN TRACK AND BRIDGE ASSOCIATION.
Dec. 13. Secy., D. W. Meeker, St. Paul, Minn.
MONTANA SOCIETY OF CIVIL ENGINEERS.
Dec. 14. Secy., Forrest J. Smith, Denver Block, Helena.
ENGINEERS' CLUB OF MINNEAPOLIS.
Dec. 16. Secy., E. Nexson, Kasota Block.
WESTERN RAILWAY CLUB.
Dec. 17. Secy., W. D. Crosman, Rookery Bldg., Chicago.
ENGINEERS AND ARCHITECTS' ASSOCIATION OF SOUTHERN CALIFORNIA.
Dec. 18. Secy., F. Van Vleck, Los Angeles, Cal.
ASSOCIATION OF ENGINEERS OF VIRGINIA.
Dec. 18. Secy., J. A. Pilcher, Roanoke, Va.
BOSTON SOCIETY OF CIVIL ENGINEERS.
Dec. 18. Secy., S. E. Tinkham, City Hall.
AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.
Dec. 18. Secy., R. W. Pope, 26 Cortlandt St., New York.
ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.
Dec. 19. Secy., D. Carhart, Carnegie Library, Allegheny.
ENGINEERS' CLUB OF CINCINNATI.
Dec. 19. Secy., J. F. Wilson, Odd Fellows' Temple.
NEW YORK RAILROAD CLUB.
Dec. 19. Secy., John A. Hill, 256 Broadway, New York.
ENGINEERS' CLUB OF COLUMBUS, O.
Dec. 21. Secy., David Buel.
CENTRAL RAILWAY CLUB.
Jan. 10. Secy., H. D. Vought, "Courier" Office, Buffalo, N.Y.
SOUTHERN AND SOUTHWESTERN RAILWAY CLUB.
Jan. 16. Secy., F. A. Charplot, Macon, Ga.

NEW PUBLICATIONS.

PAST AND PRESENT MOVEMENTS FOR SANITARY PROGRESS IN MICHIGAN.—By Henry B. Baker, Secretary State Board of Health. From the forthcoming report of the Board for 1893. 8vo; paper; pp. 12; Illustrations.

This pamphlet gives some of the results of health work in Michigan during the last 25 years, especially in the restriction and prevention of zymotic diseases. The illustrations are all diagrams, intended to illustrate the decrease in sickness and death from such diseases since stringent measures have been in force. In the earlier years of the State Board of Health it did much to further the drainage of swampy and wet lands, which has resulted in a great reduction of certain classes of fever. The author of the pamphlet should be credited with a large part of the sanitary advance in Michigan, and for stimulating such work elsewhere.

MINERAL STATISTICS OF THE PROVINCE OF ONTARIO, CANADA. Fourth Report of the Bureau of Mines, 1894. Printed by order of the Legislative Assembly of Ontario. Paper; 9¾ × 6⅝ ins.; pp. 261.

This report, in addition to the usual mineral statistics and accounts of geological explorations, contains a number of articles of more than usual interest to readers in the United States. Among them are a chapter on calcium carbide and acetylene gas, containing a full account of the recent discovery of an electrical process for cheaply producing calcium carbide, and a statement of its commercial prospects, and a chapter on nickel and its uses, including nickel steel.

The number of employees engaged in the mineral industry was 6,075, as compared with 7,162 in 1893, the total wages being $1,840,289 in 1894 and 1,935,500 in 1893.

The principal productions were 131,500,000 common brick, 2,570½ tons of nickel, 35,000,000 gallons petroleum, and 1,340,000 cu. ft. dimension stone.

TRADE PUBLICATIONS.

PROJECTION LANTERNS.—J. B. Colt & Co., New York. Paper; 10 × 6⅞ ins.; pp. 108; Illustrated.

This is an illustrated catalogue and price list of optical lanterns and apparatus for the use of lecturers, etc. There are also notes and instructions as to the use and operation of the lanterns.

TRACK VELOCIPEDES.—Railway Cycle Mfg. Co., Hagerstown, Ind. Paper; 8¾ × 5¾ ins.; pp. 16; Illustrated.

This company's specialty is a light four-wheeled velocipede, with a frame and driving gear of the bicycle type. The wheels are faced with 3-16-in. rubber bands. The weight is only about 52 lbs. for a single-seat or 65 lbs. for a double-seat machine.

SWAIN PATENT LUBRICATOR.—The Swain Lubricator Co., Chicago, Ill. 8vo; pamphlet; pp. 22; Illustrated.

This is an illustrated catalogue and price list of the patent solid stick lubricator made by the above-named company. The illustrations show the method of applying the lubricator automatically to shafting, pulleys, crank pins and other forms of journals, and in the text there are many hints on lubrication and the records of several tests made with the Swain lubricator.

HYDRAULIC MACHINERY.—The Erwin Hydraulic Machinery Co., Loan & Trust Building, Milwaukee, Wis. 16mo; pp. 16.

This illustrated pamphlet describes hydraulic pumps, water pressure regulators, and the hydraulic and hand air compressors made by the above company, and intended chiefly for domestic and minor industrial uses. The company has recently added to its products a domestic steam pump for use in isolated houses and other buildings without a public water supply.

CONSTRUCTION NEWS.

CONDENSED LIST OF CONTRACTS PENDING WITH DATE OF OPENING BIDS.

Bids to be opened.	Work.	Place.	See Eng. News.
Nov. 22.	Brick paving, Marietta, O.		Oct. 31
Nov. 22.	Main sewers, Brooklyn, N. Y.		Nov. 14
Nov. 22.	Heating system, Lawrenceville, Ill.		Nov. 14
Nov. 22.	Paving bonds, Hornellsville, N. Y.		Nov. 21
Nov. 23.	Macadamizing, Norwood, O.		Nov. 14
Nov. 23.	Ventilating apparatus, New York, N. Y.		Nov. 14
Nov. 23.	Water & light bonds, Le Sueur, Minn.		Nov. 14
Nov. 23.	Light fixtures, Columbus, Ga.		Nov. 14
Nov. 23.	Light fixtures, Newark, N. J.		Nov. 14
Nov. 25.	Electric wiring, Moline, Ill.		Nov. 14
Nov. 25.	Reservoir, Winchendon, Mass.		Nov. 21
	Advertised, Eng. News, Nov. 21.		
Nov. 25.	Artesian wells (2), Mellette, S. Dak.		Nov. 21
Nov. 25.	Garbage removal, etc., Jersey City, N. J.		Nov. 21
Nov. 25.	Water main, Saratoga Springs, N. Y.		Nov. 21
Nov. 25.	Asphalt paving, New Orleans, La.		Nov. 21
Nov. 25.	Pipe sewer, Saratoga Springs, N. Y.		Nov. 21
Nov. 25.	Sewers, Washington, D. C.		Nov. 21
Nov. 25.	Improving Armory, Brooklyn, N. Y.		Nov. 21
Nov. 25.	Public lighting, Jersey City, N. J.		Nov. 21
Nov. 25.	Public lighting, Oshkosh, Wis.		Nov. 21
Nov. 25.	Earth dam, Thurber, Tex.		Nov. 21
Nov. 25.	Street cleaning, etc., Jersey City, N. J.		Nov. 21
Nov. 26.	Sewers, Cincinnati, O.		Oct. 31
Nov. 26.	Main sewer, Evansville, Ind.		Nov. 7
Nov. 26.	Electric wiring, Brooklyn, N. Y.		Nov. 14
Nov. 26.	Pumps, Philadelphia, Pa.		Nov. 21
Nov. 26.	Sewers, Cincinnati, O.		Nov. 21
Nov. 26.	Steel forgings, Washington, D. C.		Nov. 21
Nov. 26.	Sale of power plant, Brantford, Ont.		Nov. 21
Nov. 26.	School building, Newark, N. J.		Nov. 21
Nov. 27.	Granite pedestal, Washington, D. C.		Oct. 31
Nov. 27.	Stone paving, Cleveland, O.		Oct. 31
Nov. 27.	Railway ties, Moncton, N. B.		Nov. 14
Nov. 27.	Electric light plant, Topeka, Kan.		Nov. 14
Nov. 27.	Hydrants, New York, N. Y.		Nov. 21
Nov. 27.	Grading, New York, N.Y.		Nov. 21
Nov. 27.	Sewers, New York, N. Y.		Nov. 21
Nov. 27.	Brick school building, Boston, Mass.		Nov. 21
Nov. 28.	Plumbing, etc., Chicago, Ill.		Nov. 7
Nov. 28.	Water bonds, Norwood, Pa.		Nov. 7
Nov. 28.	Sewer system, Norwood, Pa.		Nov. 7
	Advertised, Eng. News, Nov. 7 and 14.		
Nov. 28.	Water-works system, Norwood, Pa.		Nov. 7
	Advertised, Eng. News, Nov. 7 and 14.		
Nov. 28.	Water-works system, Waterbury, Vt.		Nov. 21
	Advertised, Eng. News, Nov. 21.		
Nov. 29.	Street lighting, Cleveland, O.		Nov. 7
	Advertised, Eng. News, Nov. 7.		
Nov. 29.	Fire engine, Chetopa, Kan.		Nov. 14
Nov. 29.	School building, West Hoboken, N. J.		Nov. 14
Nov. 29.	Laying water pipe, New Orleans, La.		Nov. 21
Nov. 29.	Macadam road, Killingly, Conn.		Nov. 21
Nov. 29.	Pipe sewers, Fort Wayne, Ind.		Nov. 21
Nov. 29.	Sewer bonds, Portsmouth, Va.		Nov. 21
Nov. 29.	Pipe sewers, Fort Wayne, Ind.		Nov. 21
Nov. 30.	Water-wks. system, Bay St. Louis, Miss.		Nov. 14
Dec. 2.	Sewers (22 miles), Mobile, Ala.		Sept. 19
	Advertised, Eng. News, Aug. 29 to Oct. 24.		
Nov. 30.	Water-wks. system, Duquesne, Pa.		Nov. 21
	Advertised, Eng. News, Nov. 21 and 28.		
Nov. 30.	Bridge, Akron, O.		Nov. 21
Dec. 2.	Brick paving, Cincinnati, O.		Nov. 7
Dec. 2.	Artesian wells, Forman, N. Dak.		Nov. 14
Dec. 2.	Artesian well bonds, Forman, N. Dak.		Nov. 14
Dec. 2.	Dredging in Mokelumne River, Cal.		Nov. 14
Dec. 2.	Water bonds ($15,000), Newberg, Ore.		Nov. 14
Dec. 2.	Condenser, McKeesport, Pa.		Nov. 21
	Advertised, Eng. News, Nov. 21 and 28.		
Dec. 2.	Asphalt paving, New York, N. Y.		Nov. 21
Dec. 2.	Plans for sewer system, Parnassus, Pa.		Nov. 21
Dec. 2.	Irrigation bonds ($50,000), Ord, Neb.		Nov. 21
Dec. 2.	Valves for pump, McKeesport, Pa.		Nov. 21
	Advertised, Eng. News, Nov. 21 and 28.		
Dec. 2.	Public lighting, New York, N. Y.		Nov. 21
Dec. 2.	Fire engines, Toronto, Ont.		Nov. 21
Dec. 2.	Paving, etc. (16,400 sq. yds.), Toledo, O.		Nov. 21
Dec. 2.	Sewers, New York, N. Y.		Nov. 21
Dec. 3.	Water-works system, Oxford, O.		Nov. 7
	Advertised, Eng. News, Nov. 7 and 14.		
Dec. 3.	Prison work, Philadelphia, Pa.		Nov. 14
Dec. 3.	Pipe sewers, Cranford, N. J.		Nov. 21
	Advertised, Eng. News, Nov. 21 and 28.		
Dec. 3.	Artesian well, etc., League Isl. navy y'd.		Nov. 21
Dec. 3.	Paving, New York, N. Y.		Nov. 21
Dec. 3.	Sewers, New York, N. Y.		Nov. 21
Dec. 3.	Sewers, Trenton, N. J.		Nov. 21
Dec. 4.	Approaches U. S. Bldg., Davenport, Ia.		Nov. 7
	Advertised, Eng. News, Nov. 7 and 14.		
Dec. 4.	Water bonds, Middletown, Ind.		Nov. 7
Dec. 4.	Cast iron pipe, Hawaiian Government.		Nov. 21
	Advertised, Eng News, Nov. 21 and 28.		
Dec. 4.	Macadam road, New Brunswick, N. J.		Nov. 21
Dec. 4.	Artesian well, Mellette, S. Dak.		Nov. 24
Dec. 5.	Pump well, etc., Evansville, Ind.		Nov. 14
	Advertised, Eng. News, Nov. 14.		
Dec. 5.	Laying cable in Chile		Nov. 14
Dec. 5.	Water-works system, Middletown, Ind.		Nov. 14
Dec. 5.	Intake pipes, Evansville, Ind.		Nov. 14
	Advertised, Eng. News, Nov. 14.		
Dec. 5.	Light twr., Portes des Morts Rge., Mich.		Nov. 21
	Advertised, Eng. News, Nov. 21 and 28.		
Dec. 5.	Boiler, Jersey City, N. J.		Nov. 21
Dec. 7.	Iron work for movable dams, W. Va.		Nov. 14
	Advertised, Eng. News, Nov. 14 to 28.		
Dec. 7.	Improving streets, Clifton, O.		Nov. 21
Dec. 9.	Tunnel, Colorado Springs, Colo.		Nov. 21
	Advertised, Eng. News, Nov. 21 to Dec. 5.		
Dec. 9.	Electric light plant, Cincinnati, O.		Nov. 21
Dec. 9.	Gravel road, Rockville, Ind.		Nov. 21
Dec. 10.	Garbage disposal, New York, N. Y.		Oct. 31
Dec. 10.	Wharfwork at Rimouski, Que.		Nov. 14
Dec. 10.	Dredging in Christiana River, Del.		Nov. 14
	Advertised, Eng. News, Nov. 14 to Dec. 5.		
Dec. 10.	Railway station, etc., San Francisco, Cal.		Nov. 21
Dec. 10.	Iron bridge, Rapid River, Mich.		Nov. 21
Dec. 11.	Pumping engine, Cleveland, O.		Nov. 14
	Advertised, Eng. News, Nov. 14 and 21.		
Dec. 11.	Piling (62,528 ft.), St. Louis, Mo.		Nov. 21
Dec. 11.	Iron bridge, New Orleans, La.		Nov. 21
Dec. 11.	Electric light plant, Mitchell, Ind.		Nov. 21
Dec. 11.	Bridge superstructure, Toledo, O.		Nov. 21
Dec. 12.	Building superstructure, Allegheny, Pa.		Nov. 21
Dec. 12.	Arc lights (80), Shreveport, La.		Nov. 21
Dec. 14.	Reservoir, etc., Tarrytown, N. Y.		Nov. 21
	Advertised, Eng. News, Nov. 21 to Dec. 12.		
Dec. 14.	Water-works, Riverside, O. (Cincinnati).		Nov. 21
Dec. 16.	Water-works system, Greenville, Miss.		Nov. 14
	Advertised, Eng. News, Nov. 14 to Dec. 5.		
Dec. 16.	Macadamizing, Cincinnati, O.		Nov. 21
Dec. 17.	Steel rails (4,000 tons), Ottawa, Ont.		Oct. 24
Dec. 18.	Water-works, Winton Place, O.		Nov. 21
Dec. 19.	Boiler house, etc., Los Angeles, Cal.		Oct. 31
Jan. 6.	Bridge, Astoria, Ore.		Nov. 21
Jan. 7.	Street ry. franchise, New Orleans, La.		Oct. 17
Jan. 13.	Plans for court house, Galveston, Tex.		Nov. 21
No date.	Plans for ice palace, Leadville, Colo.		Nov. 21
"	Electric railway, Madison, Ind.		Nov. 14
	Advertised, Eng. News, Nov. 14 and 21.		
"	Sale or lease elec. lt. plant, Madison.		Nov. 14
	Advertised, Eng. News, Nov. 14 and 21.		

RAILWAYS.

East of Chicago.

BOSTON & MAINE.—The Pemigewasset Valley extension, noted in our issue of Oct. 31, will not be carried through Franconia Notch, but will end about a mile north of the Flume House, at a distance of six miles from North Woodstock, the present terminus. The route has been surveyed, and it is expected to complete the extension before the opening of the next season.

CHICAGO, KALAMAZOO & SAGINAW.—It is reported that a survey for an extension to Gull Lake, Mich., has been made, but that the company is experiencing considerable difficulty in securing the right of way, land-owners along the route placing exorbitant values upon their property. Gen. Man., James H. Dewing, Kalamazoo, Mich.

EASTERN INDIANA.—The directors of this company whose incorporation was noted last week, are reported to be Eugene L. Cole, M. E. Murphy, Alva Duncan, Geo. H. Fanelly, Albert Chilgren, Isaac J. Dradford and T. Baird, all of Marion, Ind.

LAKE ERIE & DETROIT RIVER.—F. H. Walker, Pres., Walkerville, Ont., writes us that nothing definite has been decided upon with regard to the proposed extension from Ridgetown, Ont., to St. Thomas, noted in our issue of Nov. 14.

LIMA NORTHERN.—The work of grading is being pushed with great vigor, in order to fulfill the contracts which call for a completion of the work by Jan. 1. A despatch from Lima, O., states that three construction crews are now at work. A passenger station is to be erected at Lima for the joint use of the Ohio Southern and the Lima Northern.

MUNISING.—Press reports state that a syndicate of La Porte, Ind., capitalists is building the railway from Munising through Alger and Schoolcraft counties, in northern Michigan, 10 miles of which has been completed. The entire line will be 80 miles in length, and will open up a vast track of pine land, owned by promoters of the road. Emmet H. Scott, F. F. Morse and R. E. Morrison, of La Porte, are said to be interested.

McKEESPORT & BELLE VERNON.—A press report states that this road is nearly completed to Fayette City, Pa. Terminal facilities at Brownsville have been secured, and a station will be erected there at once.

WASHINGTON COUNTY.—Reports of progress on this road do not indicate a speedy completion of the work. There are at present about 400 men employed on the line, but the work of grading is progressing with only fair speed. Surveys have recently begun at Ellsworth, Me., and will be completed in time to permit construction work to begin at that end of the line in the spring.

Southern.

BROOKSVILLE.—James A. Kelly, Asst. Engr., Brooksville, Ky., writes us that work on this Kentucky railway is progressing very satisfactorily. The route is now entirely located and seven miles of grading has been completed. Tracklaying will begin next week. This road will connect at Wellsburg, Ky., with the Chesapeake & Ohio. The engineers in charge are Venable & Vance, of Charleston, W. Va.

CHARLESTON, MACON & KNOXVILLE.—Geo. A. Wagener, of Charleston, S. C., president of the Security Construction Co., writes us that no surveys or contracts will be made until next year. The efforts of the company have thus far been devoted to securing capital, which is now all subscribed, and to arranging the terminal in Charleston. The city council will give 30 acres on the Ashley River for this purpose.

FLORIDA CENTRAL & PENINSULAR.—In our issue of Oct. 31 the railway projected from Starke to Deadman's Bay, Fla., was mentioned as a reported extension of the above road. In reply to our inquiry, Blair Burnell, Jr., Ch. Engr., writes that the F. C. & P. is not building such extension.

GULF & SHIP ISLAND.—We are informed that the efforts of the company are directed at present to the completion of the line from Gulfport to Hattiesburg, Miss., a distance of 71 miles. The entire line is graded, and 20 miles of track has been laid. All arrangements have been made for the completion of the road and placing it in operation by April 1, 1896. By order of the Federal Court, F. J. Stewart, Receiver, turns over the property to S. S. Bullis for completion of construction work, and with power to operate the road until such time as the receiver's certificates given him in payment for the work are paid. Gen. Man., S. S. Bullis, Hattiesburg, Miss.; Ch. Engr., W. W. Hungerford, Gulfport.

KANAWHA & PAINT CREEK.—Incorporated in West Virginia, Nov. 13, to build a railway from Paint Creek, Kanawha county, to Mercer county; capital stock, $10,000; incorporators, W. S. Edwards, Frank A. Smith, Malcolm Jackson, W. D. Smith, I. C. Jordan, all of Charleston, W. Va.

OHIO RIVER & EASTERN KENTUCKY.—According to a press report, a project is being actively pushed for a line of railway from Maysville to West Liberty, Ky. It is the intention to use the tracks of the Cincinnati, Covington & Ashland from Maysville to Hillsboro. From Hillsboro to Pine Springs, a distance of 14 miles, a new line will be built, connecting at the latter point with the railway owned by the Hixon-Rodbourn Lumber Co., the promoters of this project. From Rodbourn to West Liberty will be constructed a second portion of new road, via Elliottsville and Sandy Hook. The total length of the route thus described is 68 miles. A good coal and timber region would be opened up by such a road.

TOLEDO & OHIO CENTRAL.—Stevenson Burke, Pres., Cleveland, O., writes us that nothing has been done as yet about the extensions referred to in our issue of last week. At present, connection with the Chesapeake & Ohio at Charleston, W. Va., is depended upon for a through route to the coast.

WEST VIRGINIA SOUTHERN & MIDLAND.—Incorporated in West Virginia, Nov. 16, to build a railway from Rawlesburg, Preston county, to White Sulphur Springs, Greenbrier county; capital stock, $300,000; incorporators, J. B. Metcalf, New York; Jed Hotchkiss, Staunton, Va.; J. F. McGraw, Grafton, W. Va.; T. S. Riley, Wheeling, W. Va.; J. C. Frazer, Berkley, W. Va.

Northwest.

CHICAGO, FAIRCHILD & EAU CLAIRE RIVER.—The tracklaying on the 25-mile extension toward Greenwood from Fairchild is rapidly nearing completion, and it is expected that this branch, which opens up a fine hardwood district, will soon be in operation. The road is owned by the N. C. Foster Lumber Co., and is used almost exclusively as a logging road, few passenger trains being operated.

DUBUQUE & TOLEDO.—A press report from Dubuque, Ia., states that a number of heavy shippers of that place are organizing to build a railway to Toledo, Ia., a distance of 90 miles. The object is to connect at that point with the Chicago & Northwestern, and thus open up new and valuable territory to Dubuque trade. It is thought half the money necessary can be raised in Dubuque and the balance along the line of the road.

ILLINOIS CENTRAL.—The purchase of the St. Louis & Belleville road by this company will give it an independent entrance to St. Louis, only a short extension from Belleville, Ill., to some point on the main line being necessary to complete the connection. At present the Illinois Central depends upon the Vandalia & Cairo Short Line for its St. Louis terminus. The St. Louis & Belleville is 14 miles in length, extending from East St. Louis to Belleville, and press reports say it sold for $500,000.

MANISTIQUE & NORTHERN.—Another northern Michigan railway project has been started, according to a report from Ishpeming. This road is to be built from Manistique to Negaunee and Ishpeming, a distance of about 90 miles, and its object is to secure a portion of the ore traffic. The enterprise contemplates also the construction of docks at Manistique. It is said that contracts for construction have already been let.

MINNEAPOLIS & ST. LOUIS.—A survey was recently begun by the engineers of this company for a new line from Chaska to Excelsior, Minn., about 12 miles. It is thought that all through trains will take the new route when completed. Ch. Engr., Col. Wm. Crooks, Minneapolis.

Southwest.

KANSAS CITY ELDORADO & SOUTHERN.—According to press reports work is to begin at once on this road at Eldorado, Mo., from which place it is to be built to some point on the Missouri, Kansas & Texas, not far from Kansas City. Pres., John C. Orrick, of St. Louis.

PINE BLUFF & WESTERN.—Incorporated in Arkansas, Nov. 13, to build a railway, as described in our issue of Oct 10, to extend from Pine Bluff through Jefferson, Grant and Hot Springs counties, to Malvern; capital stock, $500,000. It is reported that the incorporators are W. X. Fuller, L. A. Dodge, J. W. Beall, Jr., of Boston, and J. A. Gaylord, of New York.

ST. LOUIS, CAPE GIRARDEAU & FORT SMITH.—A press report states that Louis Houck, receiver of the St. Louis, Cape Girardeau & Fort Smith R. R. has been authorized to issue $40,000 receiver's certificates to put the road in first-class condition between Delta and Cape Girardeau, Mo.

WACO, THORNTON & SABINE PASS.—A. D. Procter, president of the Thornton (Tex.) Business League, which has been an active promoter of this road, writes us that it is expected to let contracts about Jan. 1. Right of way has been donated, and the necessary capital has been partially secured. The projected length of the line is 250 miles, from Waco to Sabine Pass, through the towns of Mart, Thornton, Evergreen and Keno. Pres., R. P. Duncan; Ch. Engr., E. M. Lord, both of Waco, Tex.

Rocky Mt. and Pacific.

ALBUQUERQUE, COLORADO & PACIFIC.—According to a press report there has been incorporated in Colorado a company under the above name, whose object is to build from Albuquerque to the coast, through Durango, Grand Junction, Colo., Salt Lake City, and thence to Puget Sound. The president of the company is said to be J. W. Hanna.

CANADIAN PACIFIC.—A Spokane (Wash.) despatch contains the information that this company is contemplating an extensive project to shorten its present route to the Pacific by 200 miles. At Dunmore, a point of about the same longitude as Great Falls, Mont., the main line bends to the northward, and makes a wide detour before reaching Vancouver. A spur 100 miles in length has already been built directly west from Dunmore to Lethbridge, and it is proposed to extend this branch in as nearly an air line as possible to Vancouver. This route would pass through the rich West Kootenay mining region, and offer very superior advantages over the present northern route.

CARIBOO.—A press report from Seattle states that a 350-mile railway from Kamloops, British Columbia, northward to the Cariboo gold fields, is to be built in the near future. The enterprise is in the hands of those interested in the mines near Barkerville, a region said to be as rich in gold as any in this country. A. D. Whittier, of Barkerville, B. C., is actively interested in the project. The Canadian Pacific has several times been reported as about to build a branch line into this district.

FLORENCE SOUTHERN.—R. L. Kelly, Ch. Engr., Florence, Colo., writes that the final location surveys were completed on Nov. 1. Right of way is all secured and terminal facilities arranged for both at Florence and Silver Cliff. Capital for construction has been partly guaranteed, but as yet no steps toward letting contracts have been taken. Pres., Wm. E. Johnson, Denver, Colo.

SAN FRANCISCO & SAN JOAQUIN VALLEY.—Reports of active work on this California road are constantly coming in, and rapid progress both in surveying

and actual construction is being made. About 80 miles remains to be located. Track is now being laid south from Stockton, and in the near future this work is to start at two other points. It is expected that the road will be in operation to Bakersfield in a year from the present time. Pres., Claus Spreckles; Ch. Engr., W. B. Storey, Jr. Principal office, 321 Market St., San Francisco.

SANTA CLARA VALLEY.—The promoters of this railway, whose incorporation was noted in our issue of Sept. 5, have been working to secure a right of way, and only a short distance now remains to be secured. A shipload of steel rails from New York is expected to arrive in March, and to be laid in time for the next season's fruit trade. The road is to be but eight miles in length, connecting San Jose, Cal., with Alviso on the bay.

SPOKANE FALLS & NORTHERN.—D. C. Corbin, Pres., Spokane Falls, Wash., writes us that a 14-mile extension, under the name Columbia & Red Mountain Ry., is to be built to connect with the Red Mountain Ry. in British Columbia, thus gaining entrance to the mining region near Red Mountain. Ch. Engr., E. J. Roberts, Spokane, Wash.

STREET AND ELECTRIC RAILWAYS.

BANGOR, ME.—H. L. Mitchell, Pres., Bangor, writes us that the right of way has been granted and tracks and poles located outside of Bangor for the Hampden & Winterport Electric Ry., 26 miles long. The capital for the construction will be secured in April. Contracts have not been let. The company will build the road.

BOSTON, MASS.—The Interstate Consolidated St. Ry. Co. has been granted permission to increase its capital stock by $400,000, for the purchase of street railways in Attleboro, North Attleboro, Wrentham, etc. Edward B. Price, of North Attleboro, is interested.——A company is being formed to build a street railway from Newton Centre to Brookline, and, later, through Newburg St., Boston, and among those reported as interested are Wm. H. Lincoln, agent of the Leyland Steamship Co.; W. A. Boland, formerly of the Thomson-Houston Electric Co., and late director of the Nassau St. Ry. Co., of Brooklyn, N. Y.; Alfred D. Chandler, Wm. I. Bowditch, M. P. Kennard, late Asst. Treas. United States; George F. Bouve, Treas. Bouve, Crawford & Co., and Anson M. Lyman, all of Brookline, and Samuel Jackson, of Newton.

CONWAY, MASS.—The Conway Electric Ry. Co. will petition for permission to extend its road to Deerfield, Greenfield, Ashfield and Plainfield, about 12 miles. W. G. Avery is interested.

HAVERHILL, MASS.—The Haverhill, Georgetown & Danvers St. Ry. Co. was reorganized Nov. 12. Directors: Walter M. Brewster, of Georgetown; James F. Shaw, of Newburyport; Warren W. Potter and John A. Gile, of Haverhill; A. S. Paton, H. L. Pierce, of Leominster; Frank E. Lowe, of Greenfield. The work will be commenced at once, and a bond of $5,000 has been filed with the chairman of the Bradford board of selectmen to guarantee the immediate construction of the road. The new men interested in the road are well-known electric road investors. The company has already received several loads of ties, and the rails are expected in a short time.

MILLBURY, MASS.—A company has been organized to construct an electric railway, 10 miles long, from Millbury to Douglas, by way of Sutton Centre and Manchaug, at an estimated cost of $200,000. Pres., James W. Stockwell, Sutton, Mass.; Vice-Pres., Thos. Meek, East Douglas. E. W. Shedd and Francis A. Harrington, of Worcester; and L. L. Whitney, of Millbury, are interested.

PALMER, MASS.—The selectmen have granted a franchise to the Palmer & Monson St. Ry. Co. for building its electric road to Palmer. Work on the proposed road will be begun in the spring.

ROCKPORT, MASS.—The Rockport St. Ry. Co. has been incorporated to build an electric road, eight miles long; capital stock, $125,000; incorporators, W. B. Ferguson, of Malden, Mass.; Leander M. Haskins, Chas. H. Cleaves, Henri N. Woods, of Rockport; Alfred D. Bosson, of Chelsea, Mass.; A. R. Hallowell, of Gloucester, Mass.

SHELBURNE FALLS, MASS.—Herbert Newell, of Shelburne Falls, writes us that surveys are now being made for an electric road, seven miles long, between Buckland, Shelburne and Colrain. The route is being investigated, to ascertain whether the road is feasible. The committee having the work in charge has not yet made a report. A company will probably be organized soon to build the road. An engineer has not yet been selected.

MILFORD, CONN.—F. L. Tibbals, of New Haven and Milford, Conn., writes us that a preliminary survey has been made for the construction of the Milford St. Ry. Co.'s electric road, 10 miles long, in this city. The officers have not yet been elected.

SHELTON, CONN.—The Shelton St. Ry. Co. has been reorganized, and will soon make a connection between Shelton and Derby; capital stock, $22,000; directors, Thomas L. Watson and Allan W. Paige, of Bridgeport; W. J. Miller and D. S. Brinsmade, of Shelton, and W. S. Downs, of Derby.

ALBANY, N. Y.—The Albany, Helderberg & Schoharie Ry. Co. has been incorporated to build an electric railway, 30 miles long, from Albany to Schoharie; capital stock, $300,000; directors, Jonas H. Brooks, B. M. Secor, John W. Van Valkenburgh, Robert J. McCauley, of Albany, and others.

BROOKLYN, N. Y.—The Kings, Queens & Suffolk Counties R. R. Co. has applied to the state railroad commissioners for permission to construct a bicycle electric railway, 10 miles long, from Brooklyn to Far Rockaway, at an estimated cost of $40,000 a mile. About $75,000 has already been subscribed, and $125,000 more is said to be available at once. Work will be begun as soon as the necessary permission is granted. The line will be an elevated road, built on steel or wooden trestles, and will at no point touch grade. It is proposed to run the cars at from 50 to 100 miles an hour. Engr., Eugene R. Smith; Pres., Frederick W. Dunton, 106 Fulton St., New York.——The East River & Atlantic Ocean R. R. Co. has been incorporated, with a capital stock of $3,000,000; incorporators, P. H. Flynn, Silas B. Dutcher, J. C. Brower, F. C. Cocheu, W. J. Studwell and G. S. Studwell. The company proposes to construct about 20 miles of electric road. The incorporators are officials of the Nassau Electric R. R. Co., which has recently built an electric road in the city, and which last week secured a lease of the entire Atlantic Ave. system. The new system will be one of the most extensive in the country. Pres., A. L. Johnson, Brooklyn.

BUFFALO, N. Y.—Daniel W. Allen, who is soliciting subscriptions for stock, reports that nearly enough stock is taken to assure the success of the proposed electric road to Hamburg.

FULTON, N. Y.—Local papers state that the street railway is to be extended to Minetto and Lower Oswego Falls, and the entire line is to equipped with electricity. Pres., Geo. N. Burt, Oswego; Vice-Pres., N. N. Stranahan, Fulton; Secy. and Treas, Geo. D. Hart, Oswego.

NEW YORK, N. Y.—A certificate of agreement has been filed of the consolidation of the Metropolitan St. Ry. Co. and the Columbus & Ninth Ave R. R. Co., under the former name. The capital stock of the consolidated companies is $16,500,000, which is the same as the combined capital of the two companies. The two roads form a continuous line in New York city. Pres., Herbert H. Vreeland, of New York; Vice-Pres., D. B. Hasbrouck, of Brooklyn; Treas., Hans S. Beattie, of New York; Secy., Charles E. Warren, of Brooklyn; directors, Ralph L. Anderton, Jr.; F. S. Pearson, G. B. M. Harvey and J. Wadsworth Ritchie, of New York.——The Third Ave. R. R. Co. has filed a bond for $500,000 with the comptroller for the immediate construction of the Kings Bridge road.

WILSON, N. Y.—The right of way has been secured for an electric road from Youngstown to Wilson and Pekin, N. Y., where it will connect with a line for Buffalo. Peter B. Secord, of the Sutherland House, Wilson, is interested.

ASBURY PARK, N. J.—It is reported that articles of incorporation and a map of location have been filed at Trenton, showing the proposed route of a new electric road from Belmar to Point Pleasant. The railway is to be known as the Asbury Park, Belmar, Spring Lake & Manasquan Division of the Atlantic Highlands, Red Bank & Long Branch Electric Ry. The road, after passing around Belmar, will pass through Como, North Spring Lake, Spring Lake, Sea Girt, Manasquan, Brielle and Point Pleasant. Connections will be made at Asbury Park with the Atlantic Coast line, which runs to Long Branch and Pleasure Bay. Work on the new road will be begun at once.

ALLEGHENY, PA.—Fred Erk, Haslage Ave., Allegheny, writes us that surveys have been made and right of way secured for the Spring Hill Electric Ry., four miles long, between Pittsburg and Allegheny. The capital for the construction has been secured, and contracts will soon be awarded.

ORANGE PARK, FLA.—J. F. Eldridge, of Orange Park, writes us that preliminary work has just been begun toward the organizing of a company to construct an electric railway to Jacksonville, 13 miles.

CLEVELAND, O.—The Lorain & Cleveland Ry. Co. was incorporated Nov. 11 to build an electric railway 24 miles long; capital stock, $500,000; incorporators, E. G. Tillotson, Treas. Cleveland Trust Co., Cleveland; B. Mahler, E. W. Moore, S. H. Short, J. B. Hoge.——O. D. Miller, J. H. McArthur and others have petitioned the council to grant permission to the Cleveland Electric Ry. Co. to extend its road to the South End.

NEW ALBANY, IND.—The Highland Electric R. R. Co. has been incorporated with a capital stock of $25,000; directors, Henry Terstegge, John H. Shrader, Jacob Zinmeister, Charles Schwartzel and George W. Tuley, all of New Albany.

VALPARAISO, IND.—It is stated that an electric railway is proposed from this city to Porter, on Lake Michigan. The men interested in the road are W. W. Kimball, Pres. Chicago Hydraulic Pressed-Brick Co., which has a large plant at Porter; Deloss D. Phelps and W. W. Shope, of Chicago; H. B. Darling, of Boston, and Messrs. Harris and Evans, of Worcester, Mass., all of whom are interested in the Porter Land Co. The proposed line will touch Flint Lake, a summer resort, three miles north of here, and Chesterton and Porter.

BENTON HARBOR, MICH.—It is stated that a franchise for an electric road five miles long has been granted to J. S. Clark, of Chicago, Ill. The road will cost $75,000, and will be completed by July.

CHICAGO, ILL.—It is reported that the Alley Elevated R. R. Co. contemplates the construction of a cross-town electric surface line. The estimated cost is $300,000; estimated earnings, $365,000. The plan is to run the surface cars on inclines at the elevated portion of the line, and transfer passengers to present platforms.——The General Electric Ry. Co. is considering several propositions for constructing its road in the downtown district of the city. Henry Brandenburg is interested.

ST. LOUIS, MO.—Belden & Seely, of New York, N. Y., have been awarded the contract for rebuilding the Fourth & Arsenal St. Ry., at $65 000 for constructing and $35,000 for equipping the line with electricity, which includes furnishing 12 cars at $2,500 each. Pres., Chas. Green; directors, A. B. Ewing, Finny How and D. J. Mahoney.

SEATTLE, WASH.—The Air Line R. R. Co. has been organized to construct an electric railway between Seattle and Tacoma. Evan L. Jones, of Tacoma, M. L. Hamilton, of Sunnydale; J. G. Ely, of Des Moines, and G. A. Hill, of Seattle, are interested.

ELECTRIC LIGHT AND POWER.

AUGUSTA, ME.—W. B. Getchell, Engr., Augusta, writes us that as soon as the Maine Electric & Water Power Co.'s flowage rights are settled the company proposes to build dams and furnish water power by using the Sheepscot River for 20 miles between Palermo and Wiscasset. This work was noted in our issue of Oct. 31. Wm. Doe, Cooper's Mills, Me., is the projector.

PLAINVILLE, CONN.—Hiram Carter, Chn. Com., writes us that nothing has yet been done toward the construction of an electric light plant.

GOWANDA, N. Y.—F. E. Bard, Village Clk., writes us that the village is to raise $1,200 a year for five years to light the streets. The village wants to get some company to put in an electric light plant.

MECHANICSVILLE, N. Y.—It is proposed to construct a power plant below this village to supply electricity and power to the places in the vicinity of Troy and Albany. Geo. B. Perry is interested.

NEW YORK, N. Y.—Bids are asked until Dec. 2 for furnishing public gas and electric lights for one year. Wm. Brookfield, Comr. Pub. Wks.

SCHENECTADY, N. Y.—A certificate of an extension of capacity, to furnish light, heat and power in Rotterdam, Glenville and Niskayuna, has been filed by the Schenectady Illuminating Co. The capital stock is $100,000. John Kruesi, Charles A. Leb and George W. Jones are the trustees.

JERSEY CITY, N. J.—Bids are asked until Nov. 25 for furnishing about 7,000 electric, gas, or oil lights for one year. Geo. R. Patterson, Chn. Municipal Lighting Com.

MONTCLAIR, N. J.—The council has granted a franchise to the Montclair Light & Power Co. to construct an electric light plant, 1,000 incandescent lights to be in operation within four months from the acceptance of the franchise. It is expected that the construction will be commenced at once. This company was incorporated in May, with a capital stock of $50,000, by Geo. F. Baker and Chas. E. Poe, of New York, and W. W. Ames and others of Montclair.

AVOCA, PA.—John F. Conaboy, Borough Clk., writes us that at an election held Nov. 5 it was voted by a large majority that the borough be lighted by electricity. Bids will now be received for constructing a plant.

CATAWISSA, PA.—F. R. Dent, Cy. Clk., writes us that Chas. E. White, 411 and 413 Walnut St., Philadelphia, has been awarded the contract, at $7,520, for putting in a complete electric light plant, excepting the building, to be in operation by January. Bonds for $7,800 will be sold about Dec. 2. Engr., W. G. Yetter; W. O. Dewitt is the official in charge.

REYNOLDSVILLE, PA.—The construction of an electric light plant and an electric road three miles long is being considered, according to reports.

TAMPA, FLA.—The bids recently received by the committee for electric lighting have been rejected, and it is now probable that the city will put in its own plant. P. G. Wall, Jr., Chn.

EUFAULA, ALA.—P. B. McKenzie, Mayor, writes us that J. L. Ludlow, Winston, N. C., has been awarded the contract to make surveys for an electric light plant, water-works, etc. It is expected that plans will be submitted about January.

SHREVEPORT, LA.—Bids are asked until Dec. 12 for furnishing 50 to 80 arc lights for 5 or 10 years; check, $2,500; bond, $10,000. A. B. Murff, Controller.

BELLEFONTAINE, O.—It is reported that arrangements are now being made by the recent purchasers of Penn's Cave, in this county, to build an electric road to connect the cave grounds with the Lewisburg & Tyrone R. R. at Center Hall, and also for the illumination of the cave with electricity.

CINCINNATI, O.—Bids are asked by the board of administration until Dec. 9 for a new electric light plant at the Hunt St. pumping station. A. P. Butterfield, Clk.

TIPPECANOE, O.—The council is considering the question of constructing an electric light and water-works plant. E. A. Jackson, Cy. Clk.

ATLANTA, IND.—A company is being organized to construct an electric light plant, work on which will probably be begun soon. Henry Roads, Cy. Clk.

MITCHELL, IND.—Bids are asked by the town board until Dec. 11 for constructing an electric light plant. Lyman B. Crawford, Town Clk.

CARROLLTON, ILL.—Rainey, Simpson & Kenny have submitted a proposition to the council to construct an electric light plant.

CHICAGO, ILL.—J. L. Silsbee has prepared plans for a power house for the proposed electric light plant for the west side parks, described in our issue of last week. As soon as the plans for the power house and those for the plant prepared by Foree Bain, Monadnock Bldg., are approved by the park board, bids for the construction will be asked. The system will have 625 arc lights, and is estimated to cost $175,000.

PEORIA, ILL.—The Peoria General Electric Co. proposes to put in a 1,000-HP. engine, which will be coupled to a 16,000-light dynamo. Pres., Thos. Coffey; Secy., Patrick Farrelly.

OSHKOSH, WIS.—Bids are asked until Nov. 25 for lighting the public places with electricity or gas. W. T. Ellsworth, Chn. Com.

PACIFIC, MO.—E. A. Gull, Engr., St. Louis, is making surveys for a power plant at this place. The plant, which will develop about 3,000 HP., is to furnish power for the electric railways and electric plants owned by J. D. Houseman, Jr., St. Louis.

WEBB CITY, MO.—J. J. Funk, Mayor, writes us that at the public auction of the electric light franchise Nov. 6, C. M. Mauker, of Webb City, bid 2% of the gross receipts of the entire plant, and C. J. Croell, of St. Louis, bid 2¼%; no action yet taken.

MILES CITY, MONT.—It is reported that the council has voted to issue $17,000 in bonds for an electric light plant and water-works.

MONMOUTH, ORE.—J. H. Hawley, Pres. Bd. City Improvements, writes us that at present parties are considering the question of light and water for this city, but no definite plans or propositions have yet been made.

PROVO CITY, UTAH.—It is stated that contracts will soon be let for building a dam and a ditch on the Provo River near the Provo Canyon, about nine miles from this city, for a power plant. The plans of the promoters for the present are to put in a 2,000-HP. generating plant, but all the preliminary work will be constructed so that the entire river can be drawn on for power, and it is estimated that the river will render a capacity of at least 10,000 HP. T. A. Davis, of Salt Lake City, and L. L. Nunn, of Telluride, Colo., are interested.

SEATTLE, WASH.—It is stated that the Seattle Power Co. will spend $3,000,000 in a plant for this city, the power to be supplied from Cedar River by Swan Lake. Pres., E. H. Ammidown.

BRANTFORD, ONT.—Bids are asked by the Brantford Electric & Power Co., until Nov. 26 for the purchase of the Brantford canal level and electric lighting and power plant. John McGeary, Secy. and Treas., 80 Market St., Brantford; Wilson & Watts, solicitors, Court House, Brantford.

NEW COMPANIES.—Johnson-Lundell Electric Co., New York, N. Y.; $500,000; to manufacture dynamos and electrical apparatus to produce light; Edward H.

Johnson, Robert Lundell, Frank S. Hastings, Harry E. Robinson, Martin J. Quinn, Edward Beers, New York.

Leechburg Electric Light & Power Co., Leechburg, Pa.; $16,000; J. D. Orr, J. M. Anderson, C. A. Long, Leechburg.

Contoocook Electric Light Co., Contoocook, N. H.; $10,000; W. S. Davis.

Dickinson Electric Supply Co., New York, N. Y.; $10,000; Henry S. Ritter, Henry H. Dickinson, Arthur S. Goodacre.

Lexington Electric Co., Lexington, Mo.; $80,000; E. R. Kimball, E. G. Taylor, C. A. Burton, E. O. Marquis, D. M. Wolde.

Key West Electric Light & Power Co., Key West, Fla.; $25,000; Charles Curry, M. L. Kellings, M. W. Curry, Joseph Y. Porter.

Sun Vapor Street Light Co., St. Paul, Minn.; $25,000; Thomas B. Scott, A. G. Gallasch, A. G. Briggs, W. P. Harper, of St. Paul; H. A. Smith, Minneapolis.

Metropolitan Electric & Power Co., Allegan, Mich.; $500,000, with $100,000 paid in; D. E. Knight, A. C. Bingham, Thos. Syvesten, C. M. Petersen, all of Marysville.

Metropolitan Electric & Power Co., Allegan, Mich.; $200,000; C. G. S. Thomas, Arthur S. Pinkham, Paul C. John S. Ranney, Chicago, Ill.; Frank E. Remon, Allegan.

New Jersey Incandescent Light Co., Newark, N. J.; $100,000, with $85,000 paid in; Barnett Shats, New York, N. Y.; Wm. M. Keane, J. Albert McGown, Newark.

Atlantic City Light, Heat & Power Co., Atlantic City, N. J.; $250,000; James R. Merritt, Philadelphia, Pa.; William E. Findley, New York; John M. Kelly, Camden, N. J.

Oregon Electrical Construction Co., Portland, Ore.; to construct telegraph and telephone lines between Portland and Astoria; $20,000; J. S. Urquhart, George F. Housner, F. C. Miller.

Eclipse Electric Lamp Mfg. Co., Buffalo, N. Y.; $100,000; Thomas F. Crean, Brooklyn; H. H. Fuller, Elmira; W. C. Page, New York; W. H. Crosby, Buffalo; W. M. Morrison, Montclair, N. J.

Pacific Coast Telephone & Electric Motor Co., Los Angeles, Cal.; $100,000, with $12,800 paid in; T. M. Gibson, Wm. C. Harrison, John C. MacCabe, L. Weatherbolt, H. J. Lloyd, of Los Angeles.

Chemung Gas & Electric Light Co., Elmira, N. Y.; $200,000; C. G. S. Thomas, Arthur S. Pingham, Paul C. Safford, Frank McKelvey, John Doyle, George T. Carhart, Albert E. Ettinger, all of New York city.

Susquehanna Construction Co., Conowingo, Md.; $100,000; to construct the power plant at Conowingo that will supply electricity to Baltimore; J. Wesley Kerr, Otto J. Fischer, John Henry Miller, George K. McGaw, Fridge Murdoch. Consult. Engr., Clemens Herchel, 2 Wall St., New York, N. Y.; Designing Engr., James H. Harlow, Times Bldg., Pittsburg, Pa.

BRIDGES.

LOWELL, MASS.—Geo. Bowers, Cy. Engr., informs us that the following bids were received Nov. 14 for building the steel superstructure for the Moody St. bridge, as noted in Engineering News:

Pennsylvania Steel Co., Steelton, Pa.	$96,240
Norton Iron Co., East Everett, Mass.	76,634
Dean & Westbrook, New York	62,440
Carnegie Steel Co., Pittsburg, Pa.	65,438
Boston Bridge Works, Boston, Mass.	58,350
Massillon Bridge Co., Massillon, O.	65,000
Toledo Bridge Co., Toledo, O.	85,425
Edge Moor Bridge Works, Wilmington, Del.	57,400
Wrought Iron Bridge Co., Canton, O.	60,777
R. F. Hawkins Iron Works, Springfield, Mass.	59,946
Canton Bridge Co., Canton, O.	68,788
New Columbus Bridge Co., Columbus, O.	68,500
King Bridge, Cleveland, O.	58,500
John E. Buddington, New Haven, Conn.	72,000
Penn Bridge Co., Beaver Falls, Pa.	58,990
Keepers & Thacher, Detroit, Mich.	59,990
Groton Bridge & Mfg. Co., Groton, N. Y.	57,500
Berlin Iron Bridge Co., East Berlin, Conn.	60,739

NEW HAVEN, CONN.—C. W. Kelly, Cy. Engr., writes us that plans for the drawbridge to cost $50,000 at Grand Ave. have not yet been completed.—Nothing will be done about the Derby Ave. bridge for at least a year.

BROOKLYN, N. Y.—It is stated that the joint committee of Kings and Queens counties boards of supervisors have adopted new plans for the proposed bridge over Newtown Creek; estimated cost, $250,000. John J. McLaughlin, Engr., Jamaica, N. Y., has been directed to prepare specifications and the necessary papers in order that bids may be advertised for at once.

LITTLE FALLS, N. Y.—Geo. W. Aldridge, State Supt. Pub. Wks., Albany, informs us that the following bids were received Nov. 12 for building a bridge in this place: Rochester Bridge & Iron Works, Rochester, N. Y., $7,446; Havana Bridge Works, Montour Falls, N. Y., $8,600.

PITTSBURG, PA.—It is reported that the Allegheny & Westmoreland Bridge Co. has submitted plans for a new bridge, to cross the Monongahela River at Sutersville, Pa. The plans are at the office of Maj. R. L. Hoxie, U. S. Engr., 411 Federal Bldg. Address H. H. Swaney, Solicitor, 81 Diamond St., Pittsburg.

ROCHESTER, PA.—C. A. Danalt, Secy., Rochester, writes us that the Ohio River Bridge Co. has awarded the contracts for the construction of its bridge across the Ohio River at this point as follows: Substructure, Jutte & Foley Co., Pittsburg, Pa.; superstructure, Penn Bridge Co., Beaver Falls, Pa. The bridge is to be a steel suspension bridge, having an 800-ft. channel span and a 400-ft. shore span at the south and north ends, depending upon the cables for support, and about 700 ft. of trestle at the north end, making a total length of 2,300 ft., and will cost $175,000. The bridge is to be completed in ten months from date of contract. Engr., E. K. Morse, Penn Bldg., Pittsburg.

WILKES BARRE, PA.—It is stated that bids will soon be asked for by the Wyoming Valley Traction Co. for constructing an iron bridge, 1,000 ft. long, to cost $30,000, over the railway tracks. Gen. Man., J. Graham.

WASHINGTON, D. C.—The government engineers expect to complete the boring this month for a bridge over the eastern branch of the Potomac River at South Capitol St.

ANDERSON, S. C.—J. H. Whitner, C. E., of Knoxville, Tenn., has been awarded the contract for two 130-ft. spans over the Saluda River, at $4,800, by the supervisors of Anderson and Greenville counties.

ABBEVILLE, LA.—W. W. Edwards, Chn. Com., informs us that the following bids were received Nov. 5 for constructing a swing bridge, as advertised in Engineering News:

*Penn Bridge Co., Beaver Falls, Pa.	$10,550
Toledo Bridge Co., Toledo, O.	10,900
Cowan Bridge Co., Chattanooga, Tenn.	11,300
Gillett-Herzog Mfg. Co., Minneapolis, Minn.	10,850
Virginia Bridge & Iron Co., Roanoke, Va.	11,000
King Bridge Co., Cleveland, O.	10,900
Ohio Bridge Co., Toledo, O.	12,530
Geo. E. King Bridge Co., Des Moines, Ia.	11,018
Brackett Bridge Co., Cincinnati, O.	11,025
Variety Iron Works, Cleveland, O.	10,990
New Columbus Bridge Co., Columbus, O.	11,263
Mo. Valley Bridge & Iron Wks., Leavenworth	11,993

* Awarded contract.

NEW ORLEANS, LA.—Bids are asked until Dec. 11 for constructing an iron bridge at Claiborne St. over the New Orleans Navigation Canal. Bidders to be eligible must pay a city license of $120. Chas. R. Kennedy, Comptroller.

AKRON, O.—Bids are asked until Nov. 30 for constructing a bridge 84 ft. long and 55 ft. wide over the Ohio Canal at Thornton St., to replace a wooden structure which fell Nov. 11. S. W. Parshall, Cy Engr.

CLEVELAND, O.—M. E. Rawson, Ch. Engr., writes us that thus far only an approximate estimate has been called for in regard to a bridge at Rhodes Ave., over Walworth Run. There is no street across the ravine at Rhodes Ave. No steps have yet been taken either for a street or bridge, but authority from the legislature is likely to be asked for this purpose this winter. The structure will be over 500 ft. long, and will cost $90,000.

DAYTON, O.—The construction of two bridges to cost $250,000 is proposed, according to reports.

TOLEDO, O.—Bids are asked until Dec. 11 for constructing the superstructure for a bridge over the canal in Providence township. Chas. H. Jonas, County Audr.

RAPID RIVER, MICH.—Bids are asked until Dec. 10 for constructing an iron bridge 120 ft. long, with approaches 260 ft. long. James Johnson, Highway Comr.; Fred Darling, Township Clk., Rapid River; Engr., D. A. Brotherton, Escanaba, Mich.

SIOUX CITY, IA.—Sooysmith & Co., Mills Bldg., New York, N. Y., have been awarded the contract for constructing the Iowa approach to the Pacific Short Line bridge. The work will be begun about Nov. 25, and will require 210,000 ft. of lumber and 6,000 ft. of piling.

TOPEKA, KAN.—On Nov. 5 the people of Shawnee county voted to issue $150,000 in bonds for constructing an arch bridge at Kansas Avenue, according to reports. The structure will consist of seven spans, and will be 700 ft. long, as described in our issue of Sept. 26. Engrs., Keepers, Wyncoop & Thacher, 53 Telephone Bldg., Detroit, Mich.; J. F. Hinckley, 2017 Rutger St., St. Louis, Mo.

KANSAS CITY, MO.—A viaduct is to built over the railway tracks at 23d St., to cost $43,000. Bids will be asked in about a month. H. H. Filley, Cy. Engr.

HOUSTON, TEX.—The following bids were recently received for building an iron drawbridge over Buffalo Bayou, at Hill St.; John T. Browne, Mayor:

Mo. Valley Bridge & Iron Wks., Leavenw'th, Kan.	$39,990
Toledo Bridge Co., Toledo, O.	44,779
Wrought Iron Bridge Co., Canton, O.	44,980
Gillette-Herzog Mfg. Co., Minneapolis, Minn.	43,749
Youngstown Bridge Co., Youngstown, O.	42,990
Penn Bridge Co., Beaver Falls, Pa.	43,600
Chicago Bridge & Iron Co., Chicago, Ill.	42,759
New Columbus Bridge Co., Columbus, O.	38,764
King Bridge Co., Cleveland, O.	40,244

ASTORIA, ORE.—Bids are asked by the road committee until Jan. 6 for constructing a bridge over the Lewis and Clarke River, near Chadwell. H. S. Lyman, W. J. Ingalls and Wm. Larsen, Bridge Committee; C. S. Dow, Chn. Road Com.

LOS ANGELES, CAL.—The construction of two bridges over the Los Angeles River at Mary and Alliso Sts., to cost $14,170 and $10,690, respectively, is being considered. Chas. S. Compton, Cy. Engr.

BUILDINGS.

BOSTON, MASS.—Bids are asked until Nov. 27 for constructing a brick school building. Arch., Wm. H. Besarick, 14 Kilby St., Boston; Wm. T. Eaton, Chn. Com.

BROOKLYN, CONN.—The county commissioners are considering the question of making a number of improvements to the jail.

BROOKLYN, N. Y.—Bids are asked until Nov. 25 for making improvements to the armory at Dean St. and Washington Ave. Daniel Ryan, Supt. Construction.

County Court House.—The charities committee has approved plans prepared by P. J. Lauritzen & Co., of New York, for a new county hospital on Crown St., estimated to cost $350,000. Bernard Lamb, Secy. Comrs., Brooklyn.

BUFFALO, N. Y.—The Lenox Corporation of Buffalo has been incorporated to buy real estate and build an apartment house to cost over $100,000, on North St., near Delaware Ave.; capital stock, $175,000; directors, E. C. Mason, Henry W. Box, J. B. Baynes and A. L. Williams, all of Buffalo.—It is stated that a 12-story office building of granite is to be built on the site of the Old Granite Block, on Main St., near Seneca St. The estimated cost is $1,000,000. Trueman G. Avery is the owner of the property. Archs., M. E. Beebe & Son.

NEW YORK, N. Y.—The New York Steam Co., Broadway and Cortlandt St., proposes to build a 10-story office building on 50th St. near Madison Ave. The architect has not yet been selected.—It is stated that the Commercial Cable Co. proposes to erect a 21-story office building at Broad and New Sts., to cost $1,000,000, and that the plans and specifications provide for an absolutely fireproof building.—W. A. Cable, 64 Broad St., New York, has prepared plans for a nine-story building, 120 × 200 ft., at Sixth Ave. and 59th St., for the New York Athletic Club, estimated to cost $400,000.—Plans have been filed by the Woodbridge Co., 45 Cedar St., for a brick building at William St., from John to Platt St., to cost $450,000.

SYRACUSE, N. Y.—The Onondaga County Savings Bank officials are reported to have decided to purchase a lot at East Genesee and South Salina Sts., for a 10-story office building, to cost about $750,000. Chas. L. Stone, Attorney.

WESTBURY STATION, N. Y.—It is reported that Gen. Joseph T. Torrence, of Chicago, Ill., has engaged Henry Ives Cobb, of Chicago, to prepare plans and award the contracts for the construction of a residence in this place, on Long Island, to cost about $2,000,000.

JERSEY CITY, N. J.—Bids are asked by the freeholders until Dec. 5 for a new boiler for the almshouse.

NEWARK, N. J.—Bids are asked until Nov. 26 for constructing an eight-room addition to the South Tenth St. school building. Arch., H. Edward Reeve, Prudential Bldg., Newark; R. D. Argue, Secy. Bd. Education.

ALLEGHENY, PA.—Bids are asked until Dec. 12 for the superstructure and roof for the post office building in this city. Wm. M. Aiken, Supervising Arch., Washington, D. C.

PHILADELPHIA, PA.—J. Franklin Stuckert & Sons, of Philadelphia, have prepared plans for an 11-story office building, 140 × 40 ft., to cost $500,000.

CHARLOTTESVILLE, VA.—McDonald Bros., Archs., Louisville, Ky., have been engaged to prepare plans for the new buildings for the University of Virginia, recently destroyed by fire.

RICHMOND, VA.—The committee has voted to ask for plans for a new jail, to cost about $50,000.

WINSTON, N. C.—The county commissioners have decided to build a $50,000 brick and stone court house, and it is probable that a new jail will also be erected.

ATLANTA, GA.—The Southern Ry. Co. has purchased a site on which it is proposed to erect a new passenger station.

CLEVELAND, O.—It is proposed by a Chicago syndicate to construct a 15-story building on Euclid Ave. J. H. McVicker, Man. McVicker's Theater, Chicago, Ill., and Hower & Higbee, dry goods merchants, of Cleveland, are interested.

GREENFIELD, IND.—The contract for constructing the new court house, to cost $125,000, will probably be awarded in January. Archs., Wing & Mahurin, Lafayette, Ind.; Wm. M. Thomas, Comr.; Lawrence Boring, County Audr.

DETROIT, MICH.—Bids are asked until Dec. 5 for constructing the metal work for the Portes des Morts Range Light Tower, Mich., as stated in our advertising columns. Maj. M. B. Adams, U. S. Engrs., Detroit.—It is reported that the county supervisors have voted to ask for plans for a $1,000,000 court house.

CHICAGO, ILL.—Plans are being considered by the officials of the Atchison, Topeka & Santa Fe R. R. Co. for a new passenger station at State and 12th Sts.

JEFFERSON CITY, MO.—John E. Gorman, C. P. Hager, and others, have petitioned the county court to issue $60,000 in bonds for a new county court house.

ST. LOUIS, MO.—Varney & Woolrych, 300 Security Bldg., have prepared plans for an eight-story hotel on Locust St., between Ninth and Tenth Sts., to cost $340,000, for W. H. Stevenson.—Henry Ives Cobb, Arch., of Chicago, Ill., is reported as interested in a scheme to rebuild the portion of St. Louis lying east of Third St., at an estimated cost of about $23,000,000. Robert Rutledge, of Rutledge & Kilpatrick, real estate dealers, of St. Louis, is also interested.

LEADVILLE, COLO.—Plans are asked for an ice palace; prize, $100; W. L. Temple, Secy. Leadville Ice Palace and Carnival Association, Iron Bldg.

GALVESTON, TEX.—Plans are asked by the county commissioners court until Jan. 13 for a $350,000 granite court house, according to reports.

SAN FRANCISCO, CAL.—Bids are asked by the board of state harbor commissioners until Dec. 10 for constructing the Union Depot and Ferry House. Arch., A. Page Brown.

WATER-WORKS.

LIMERICK, ME.—Lisley & Cummings, of Portland, have made preliminary surveys for a water supply for this place, and it is reported that local capitalists are talking of organizing a company to construct works.

MANCHESTER, N. H.—The finance committee is making arrangements to issue $50,000 in water bonds.

WATERBURY, VT.—Bids are asked until Nov. 28 for constructing works, as described in our advertising columns. Chas. D. Robinson, Secy. Com.

HOPKINTON, MASS.—The contract for extending the works to Woodville has been awarded to J. D. O'Rourke, of Boston, at $14,750. The work will require 10,975 ft. of 8-in. pipe, 2,700 ft. of 6-in. pipe, and 12 hydrants, and is to be completed as soon as possible.

WINCHENDON, MASS.—Bids are asked until Nov. 25 for constructing a 500,000-gallon reservoir, as stated in our advertising columns. F. L. Fuller, Engr., Boston; W. C. Corey, Secy. Comrs.

BINGHAMTON, N. Y.—The "Republican" states that the water board has received the detailed plans for the proposed reservoir and that the estimates as to the cost will be ready in a few days. Engr., S. M. Gray, Providence, R. I.

BROOKLYN, N. Y.—The commissioner of city works has contracted with the Flatbush Water-Works Co. to supply water for fire protection in ward 29 (Flatbush). The company agrees to put in 200 additional hydrants, the city to pay $35 each for 188 of them.

DE RUYTER, N. Y.—It is reported that surveys are being made for works at this place, the supply to be from springs two miles distant, and having an elevation of 330 ft. above the village; estimated cost, about $12,000.

PORT JERVIS, N. Y.—The board of health has prohibited the water company from using the water from the old reservoir.

LIBERTY, N. Y.—The $10,000 worth of 4% bonds recently voted for water-works improvements has been sold at a premium of 2.78%.

NEW YORK, N. Y.—Bids are asked until Nov. 27 for a supply of double-nozzle hydrants. Wm. Brookfield, Comr. Public Wks.

SARATOGA SPRINGS, N. Y.—Bids are asked until Nov. 25, according to reports, for constructing a water main in Ludlow St., from Spring St. to Caroline St. Jas. D. McNulty, Clk.

SCHENECTADY, N. Y.—Geo. T. Ingersoll, Supt., writes us that the new works will probably be completed by July next, and will include 6,000,000-gallon pumps purchased of the Deane Steam Pump Co.; a 12×100-ft. stand-pipe, of the Ranton Boiler Co., Syracuse; pipe and specials from the Chattanooga Pipe & Foundry Co., and Ludlow valves and hydrants. Engrs., Stanwix Engineering Co., Rome, N. Y.

TARRYTOWN, N. Y.—Press reports state that John D. Rockefeiler has given land valued at $50,000 as a site for a reservoir, and that he also offers to build a water tower and lay mains.

TARRYTOWN, N. Y.—Bids are asked until Dec. 14 for constructing reservoir embankments, etc., as stated in our advertising columns. D. S. Merritt, Engr. and Supt.

TULLY, N. Y.—The contract for constructing works is reported to have been awarded to Chas. Brown, of Mohawk, N. Y. The bids were opened Nov. 4, and were noted in this column Nov. 7.

SUMMIT, N. J.—The Commonwealth Water Co., of this place, is reported to have contracted to furnish water in Millburn, and as negotiating for a similar privilege in Springfield township.

AVOCA, PA.—John F. Conaboy, Clk., writes us that the citizens have authorized the council to construct a water-works and electric light plant, and that propositions will now be considered.

DUQUESNE, PA.—Bids are asked until Nov. 30 for constructing works, as described in our advertising columns. S. A. Taylor, Engr., Wallace Bldg.; Jno. W. Lawford, Chn. Com.

LINWOOD STATION, PA.—The Chester "Times" states that Geo. B. Lindsay, Atty., will make application Dec. 2 for a charter for the Linwood Water Co., to furnish water in Lower Chichester; incorporators, Walter Wood, Stuart Wood, Wm. Newhall and others.

McKEESPORT, PA.—Bids are asked until Dec. 2 for replacing the present slide valves on the 5,000,000-gallon pump with piston balance valves, and also for an independent condenser, as described in our advertising columns. Emanuel Wolf, Secy. Comrs.

OIL CITY, PA.—Press reports state that the council has decided to move the pumping station across the Allegheny River to the Seneca Farm, above Siverlyville, and to obtain a supply by filtration through the gravel bed, at a cost of about $60,000.

PHILADELPHIA, PA.—Bids are asked until Nov. 26 for furnishing and erecting one No. 3 Worthington pump, directly connected to an electrical motor. John J. McCay, Ch. Clk. Bd. of Health.——Bids are asked until Dec. 3 for drilling an artesian well and furnishing and installing a pump, steel tower and a covered steel storage tank at the League Island navy yard. Address E. O. Matthews, Chief of Bureau, Washington, D. C.

PLAINS, PA.—The Wilkes Barre "Times" states that Morgan B. Williams is arranging to construct works to supply the village of Laurel Run.

YORK, PA.—The "Age" is urging that a new water company be organized and a meeting has been held to discuss the project.

WASHINGTON, N. C.—The city is reported as wanting bids for sinking artesian wells. John Havens, Mayor.

PERRY, GA.—At an election Nov. 15 only 11 votes were cast against issuing bonds for water-works. The water supply will probably be pumped from a stream within 1,500 ft. of the court house to a tank or stand-pipe. Bids will now be received for the materials; estimated cost, $5,500. G. W. Killen, C. E., Mayor.

ST. AUGUSTINE, FLA.—The estimated cost of the new works, as noted Nov. 7, is $67,302, including $2,141 for a well, $1,507 for aerating basin, $10,730 for pumping station, $9,250 for stand-pipe, and $37,505 for mains and hydrants. F. W. Bruce, Cy. Engr.

EUFAULA, ALA.—J. L. Ludlow, of Winston, N. C., has been engaged to make plans and specifications for water-works, sewers and an electric light plant. P. B. McKenzie, Mayor, writes us that Mr. Ludlow did not submit the lowest bid for doing the work. The plans will probably be completed in January.

GURLEY, ALA.—F. T. Walker, Cy. Clk., writes us that no contracts for works will be let until next spring. The water supply will probably be from an artesian well; estimated cost, $1,500 or $2,000; population, 1,500.

NEW ORLEANS, LA.—Bids are asked until Nov. 29 for laying 2,800 ft. of 10-in. pipe, etc. L. H. Gardner, Supt. New Orleans Water Co.

HAMMOND, LA.—A committee has been appointed to investigate the question of works.

SPRINGFIELD, TENN.—The city board is reported as considering the question of water-works and electric lights.

BAINBRIDGE, O.—John P. Martin, of Xenia, O., has been engaged to prepare plans and specifications for works, estimated to cost $25,000; water supply from a well. The question of construction is said to be yet undecided.

MOUNT STERLING, O.—The contract for constructing works has been awarded to W. R. Richards, as noted under Contract Prices. John W. Hanawalt, Clk.

RIVERSIDE, O.—Bids are asked until Dec. 14 for constructing works in this village. Address Geo. H. Gaffey, Clk., care of Chas. A. Ewing, Engr., 36 Carlisle Bldg., Cincinnati.

WELLSTON, O.—The water-works trustees have recommended to the council that the works be sold to the highest bidder. A proposition to issue bonds to improve the plant was recently defeated.

WINTON PLACE, O.—Bids are asked until Dec. 18 for constructing works. Robt. B. Poage, Clk. Chas. A. Ewing, Village Engr., 36 Carlisle Bldg., Cincinnati, writes us that the plant will be owned by the city of Cincinnati after constructed, and that the plans call for 542 tons of 10 to 4-in. pipe, 25,000 lbs. of lead, 46 hydrants, 63 valves and boxes, etc.

BOSWELL, IND.—H. A. Perry, Clk., writes us that it is not expected that works will be put in soon.

HUNTINGTON, IND.—Jno. F. Johnson, councilman, writes us that the matter of extensions and improvements has not yet been decided.

VERSAILLES, IND.—A committee is investigating the question of water-works. Maj. J. O. Cravens was chairman and Dr. R. T. Olmsted secretary of a meeting that recently discussed the subject.

WINAMAC, IND.—The citizens are reported as discussing the question of water-works.

ESCANABA, MICH.—Chas. F. Loweth, of St. Paul, Minn., has been engaged to make preliminary investigations and estimates for new works, to be built by this city, in case the city does not purchase the existing plant. H. Wilke, Cy. Clk.

SARANAC, MICH.—A proposition has been made to the council looking to the construction of water-works.

TRENTON, MICH.—An election will be held Dec. 2 to vote on a proposition to issue about $10,000 in bonds for works. At two previous elections propositions to issue $17,000 to $18,000 in bonds were defeated, but it is stated that the bonds will doubtless be voted this time.

BROOKLYN, ILL.—It is reported that $4,000 in bonds have been voted for extending the water mains.

JOLIET, ILL.—Joshua Bell, Secy. Water Dept., writes us that several propositions have been made, but that nothing has yet been done in regard to an additional water supply.

LAMOILLE, ILL.—There is talk of sinking a deep well and constructing works.

PEORIA, ILL.—The contract for the water plant at Glen Oak Park has been awarded by the park board to O'Neill & Sons, at $4,550.

COLUMBUS, WIS.—At an election Nov. 12 the citizens voted to issue $25,000 in water bonds.

HIGHLAND, WIS.—The village board has rejected a bid of about $3,200 for the construction of works, and will probably readvertise in February.

UNION GROVE, WIS.—Wm. Hardy and others are organizing a water company, according to reports.

WAUKESHA, WIS.—The court has ordered the sale of the franchises and plant of the Waukesha Water-Works Co.

DULUTH, MINN.—Local papers state that the city engineer has completed the plans for the new works to be built by the city.

LISBON, N. DAK.—C. F. Loweth, of St. Paul, has been engaged to prepare plans for works, for which the contracts will probably be awarded in the spring.

HELENA, MONT.—The council has rejected the offer of the Helena Consolidated Water Co. to sell its plant for $1,307,000, and local papers state that bids will be asked for new works.

MILES CITY, MONT.—The council has voted to issue $17,000 in bonds for water-works and an electric light plant.

GRANT CITY, MO.—It is stated that the city has voted in favor of constructing works. J. S. Hagen, Engr.; S. C. Davidson, Cy. Clk.

INDEPENDENCE, MO.—Councilmen I. M. Rogers, W. A. Cunnigham and W. C. Perry have been appointed a committee to ascertain the cost of the works with a view to the purchase of the plant by the city.

WESTBORO, MO.—It is reported that a water company has been organized, and will construct works at once.

PINE BLUFF, ARK.—J. B. White, Cy. Engr., writes us that owing to a difference between the water company and the council a committee has been appointed to confer with foreign capitalists with a view to erecting a new plant, but nothing definite has yet developed.

PALESTINE, TEX.—N. O. Gray, of St. Louis, president of the water company, is quoted as stating to the council that work will be commenced at once on additional reservoirs and other improvements. H. L. Wright, Man.

WACO, TEX.—J. D. Bell, Pres. Bell Water Co., writes us that bids will soon be asked for a new stand-pipe, about 25×42 ft.

WEIMAR, TEX.—At an election last week the citizens voted to construct works, including a stand-pipe.

COLORADO SPRINGS, COLO.—Bids are asked until Dec. 9 for constructing about 6,300 ft. of tunnel, as stated in our advertising columns. H. I. Reid, Cy. Engr.; Chas. E. Smith, Cy. Clk.

MONMOUTH, ORE.—J. H. Hawley, Pres. Improvement Com., writes us that parties are talking of constructing works, but that no definite proposition has yet been made.

ALAMEDA, CAL.—The San Francisco "Call" states that the city trustees have practically decided to put in a plant for using salt water for street sprinkling, at an estimated cost of $17,000.

SANTA CRUZ, CAL.—T. W. Wright, of this city, is preparing plans for the water-works system in East Santa Cruz, for which Henry Cowell was granted a franchise, as noted in our issue of Oct. 31. E. V. Cowell writes us that iron pipe will be used and a distributing reservoir built. The work will probably be done by the owner.

POMONA, CAL.—The citizens have voted to issue $195,000 in bonds for a gravity system, pipe ranging from 16 to 6-in. cast iron and 4-in. riveted steel for outlying districts; static head from 150 to 250 ft. W. H. Sanders, Cy. Engr.

SUISUN CITY, CAL.—An election will be held Dec. 18, according to reports, to vote on an issue of $40,000 in bonds for works.

FLAGSTAFF, ARIZ.—Jas. A. Fleming, of Phoenix, writes us that owing to cold weather and deep snow, nothing will be done in regard to the water-works at this place until next summer.

HAWAIIAN GOVERNMENT.—Bids are asked until Dec. 4 for 5,400 ft. of cast iron pipe and special castings for the Hawaiian government, as stated in our advertising columns. Address E. H. Allen, Hawaiian Consul General, 51 Leonard St., New York city.

IRRIGATION.

MELLETTE, S. DAK.—Bids are asked until Nov. 25 for sinking and casing two artesian wells in Tetonka township. B. L. Sheridan, Chn. Bd. Supervisors Spink County, Mellette.

HOLYOKE, COLO.—Bids are asked until Dec. 4 for sinking and casing an artesian well near this place. The bids recently received for this work were published under Contract Prices Nov. 7. A. H. Sumner, State Engr., Denver.

ORD, NEB.—Bids are asked until Dec. 2 for the purchase of $50,000 of 6% irrigation bonds. E. P. Clements, Secy. Bd. Directors Ord Irrigation District of Valley County.

BILLINGS, MONT.—Col. Wm. Cody, of Cheyenne, Wyo., is reported as interested in a proposed irrigation canal to irrigate 200,000 acres in the Big Horn Basin, estimated to cost $1,000,000.

NEW COMPANIES.—Co-operative Irrigation Co., Seattle, Wash.; $100,000; C. F. Reeves, E. B. Palmer, Lizzie McIntyre.

SEWERAGE.

ARLINGTON, MASS.—At a town meeting, Nov. 14, it was voted to issue $100,000 in bonds for constructing a system. W. H. H. Tuttle, Town Counsel.

STOCKBRIDGE, MASS.—The question of constructing a system is being discussed.

HARTFORD, CONN.—The construction of a 30-in. brick sewer to cost about $13,000 is being considered.

BUFFALO, N.Y.—We are informed that the following bids were received Nov. 14 for constructing sewers, all the bidders being residents of Buffalo:

Bidder.	Triangle St.	Weiss St.	Jefferson St.
John Harren	$3,891	.....	.....
Ryan & Randall	3,000	$1,541	.....
August Giuel	3,724	1,435	$8,555
Henry Horter	4,311	1,455	10,797
Jacob Ritzman	3,723	1,619	8,178
T. J. Koglin	3,996	1,570	7,045
Mumm & Seil	3,768	1,334	.....
Elmer Mighton	4,300	1,460	9,999
Wm. Franklin	3,749	1,790	.....
Geo. O. Martin	4,700	1,706	.....
T. J. Martin	4,135	1,749	9,144
Christian Smith	3,680	1,979	8,279
Henry Kebbin	4,425	1,490	.....
W. G. Smith	.....	1,348	9,498
Wm. T. Barnes	.....	1,398	.....
G. W. Moore	.....	.....	7,776

DUNKIRK, N. Y.—John King MacDonald, Cy. Engr., writes us that a system has been planned for wards 1 and 4 which will do away with the Goose Creek nuisance complained of by the state board of health. The plans have been approved by John Bogart, Consult. Engr. State Board of Health. The board also asks for the construction of an intercepting sewer, no plans for which have yet been prepared, as a contour survey of the city will first have to be made.

NEW YORK, N. Y.—Bids are asked until Nov. 27 for constructing sewers in two streets and until Dec. 2 for sewers in three streets. Wm. Brookfield, Comr. Pub. Wks., Chambers St.——Bids are asked until Dec. 3 for constructing sewers in nine streets. Louis F. Haffen, Comr. St. Improvements, 2622 Third Ave.

ROCHESTER, N. Y.—John Y. McClintock, Cy. Engr., is preparing estimates for a brick and pipe sewer 2,200 ft. long in Monroe Ave., and a branch sewer 2,700 ft. long in Maigs and Rowley. Sts. The average cut will be from 8 to 14 ft.

SARATOGA SPRINGS, N. Y.—Bids are asked until Nov. 25 for constructing a pipe sewer in Ludlow St. J. D. McNulty, Cy. Clk.

BLOOMFIELD, N. J.—Wm. I. Johnson, Township Clk., informs us that the following bids were received Nov. 11 for constructing pipe sewers, as advertised in Engineering News:

J. H. McKnight, Pittsburg, Pa	$3,239
James B. Dyer, Montclair, N. J	3,754
P. H. Harrison & Sons, Newark, N. J	2,718
Jas. Conway & Co., Newark, N. J	3,522
M. J. Callahan, Bloomfield (awd. contract)	2,589

BORDENTOWN, N. J.—Waring, Chapman & Farquhar, 874 Broadway, New York, are preparing plans for a system. Chas. R. Garwood, Cy. Clk.

CAPE MAY, N. J.—The construction of a system, to cost $100,000, is being discussed.

CRANFORD, N. J.—Bids are asked until Dec. 3 for the construction of about 25,000 ft. of 12 to 8-in. lateral pipe sewers, as stated in our advertising columns. Engr., Carrol Ph. Bassett, Summit, N. J.; R. C. Plume, Township Clk.

IRVINGTON, N. J.—We are informed that nothing definite has been done towards the construction of a system. A member of the firm of Heudenberg & Kinsey, Engrs., 106 Fulton St., New York, went over the ground recently, and made a report with recommendations. The matter is now being discussed.

TRENTON, N. J.—Bids are asked until Dec. 3 for constructing sewers in two streets. C. Edward Murray, Cy. Clk.

ALTOONA, PA.—James Gardner has been awarded the contracts for constructing 12 to 8-in. pipe sewers in three streets, and W. H. Herr for 8-in. pipe sewers in two streets. Harvey Linton, Cy. Engr.

HARRISBURG, PA.—Press reports state as follows: At a meeting of the state board of health, Nov. 14, Richard Y. Cook, Pres. Guarantee Trust & Safe Deposit Co., Philadelphia, laid before his colleagues a project for draining the entire southeastern portion of Delaware county by a sewer system through the Darby Creek Valley to tidewater. In a preliminary sense the scheme is already advanced, the council of Lansdowne, Yeadon and Darby now being engaged in making the necessary surveys and securing the right of way. The plan is to drain the places mentioned by a joint system which shall empty into a main pipe following the course of the Darby Creek to the Delaware River. Devon, Wayne, Llanerch and other centers of population farther north are expected to avail themselves of the system by connecting with the main sewer by way of the Darby and Radnor road. In this way all the territory east and south of Devon can successfully be relieved of all its drainage.

MANSFIELD, PA.—It is reported that the construction of a system is being considered.

PARNASSUS, PA.—Bids are asked until Dec. 2 for plans for a sewer system. W. J. Stewart, Clk. Council; Geo. H. King, Pres. Council, Parnassus.

PHILADELPHIA, PA.—It is proposed to construct branch sewers in a number of streets at an estimated cost of about $70,000. Chas. F. Warwick, Mayor.

WASHINGTON, D. C.—Bids are asked by the district commissioners until Nov. 25 for constructing sewers.——The committee of the board of trade has recommended the construction of a system of sewage disposal by filtration and sedimentation.

PORTSMOUTH, VA.—Bids are asked by the city clerk until Nov. 29 for the purchase of $28,000 of 5% sewer bonds.

EUFAULA, ALA.—P. B. McKenzie, Mayor, writes us that J. L. Ludlow, of Winston, N. C., was awarded the contract Nov. 5 to make surveys, plans and specifications for sewers, electric light plant, etc. The population of this place is 8,000.

NORWOOD, KY.—Wilson & Strack were the lowest of 12 bidders for the construction of sewers, at about $35,000. Engineer's estimate, $61,000.

CINCINNATI, O.—Bids are asked until Nov. 26 for constructing sewers in three streets. A. P. Butterfield, Clk. Bd. Administration.

GLENVILLE, O.—An election is to be held Dec. 10 to vote on the question of issuing $100,000 in bonds for sewers, water-works, etc.

TOLEDO, O.—L. P. Harris, Cy. Clk., informs us that the following were the lowest bids received Nov. 11 for constructing sewers: Sewer 555, 15-in. pipe, 470 ft., 3 manholes, 1 cord sand; F. E. Coe, $324. Sewer 553, 24-in. brick, 1,462 ft., 6 manholes, 4 catchbasins, 150 ft. 12-in. pipe, 1 cord sand; W. J. McMahon, $1,632. Sewer 551, 15-in. pipe, 236 ft., 1 manhole, ½ cord extra sand; Thos. Kelley, $168. Sewer 554, 24-in. brick, 1,895 ft. long, 9 manholes, 2 cords sand; tie bid, Thos. Kelley and W. J. McMahon, each bidding $1,547. Sewer 556, 24-in. brick, 438 ft., 6 manholes, 1 catchbasin, 32 ft. 12-in. pipe, 1 cord sand; Thos. Kelley, $384.

FORT WAYNE, IND.—Bids are asked until Nov. 20 for constructing about 2,700 ft. of 24 to 15-in. pipe sewers, average cut 10 to 10 ft. F. M. Randall, Cy. Engr.

PORTLAND, IND.—Daniel J. Dalton, of Anderson, Ind., has been awarded the contract for constructing a pipe sewer over a mile long, at 96¾ cts. per ft.

TERRE HAUTE, IND.—John A. Cole, 1585 Old Colony Bldg., Chicago, Ill., has been engaged by the council to prepare plans for a system estimated to cost about $300,000.

ROCHESTER, MINN.—The following bids were recently received for constructing the Zumbro St. sewer:

Patrick Donahue, Rochester	$3,381
*J. P. Thon, Owatonna, Minn.	3,060
Thomas Reilly, St. Paul, Minn.	3,140
E. E. Hulster, Kasson, Minn.	2,890
Alex. McLean, Minneapolis, Minn.	2,896

*Awarded contract at about 65 cts. per ft.

GARBAGE DISPOSAL.

JERSEY CITY, N. J.—Bids are asked until Nov. 25 for the removal of ashes and garbage until Dec. 1, 1896. Geo. T. Bouton, Clk. Comrs.

COLUMBUS, O.—New specifications are being prepared for the removal and disposal of garbage.

PEORIA, ILL.—Almon D. Thompson, Cy. Engr., with the mayor and others, has recently made a trip to Pittsburg, Williamsport, and Philadelphia, Pa., Wilmington, De., New York city, and New Brighton, Staten Island, to investigate the various systems of garbage crematories.

SANTA MONICA, CAL.—The clerk has been directed to readvertise for bids for garbage removal and disposal.

SAN FRANCISCO, CAL.—A. M. Skelly has submitted a proposition to the board of supervisors offering to build a crematory for the disposal of all garbage, etc., without cost to the city, provided he is given an exclusive franchise for doing the work for 50 years. Several other bids are also under consideration.

STREETS AND ROADS.

KILLINGLY, CONN.—Bids are asked until Nov. 29 for constructing a macadam road. Oliver W. Bowen, Selectman.

HORNELLSVILLE, N. Y.—Bids are asked by the city chamberlain until Nov. 22 for the purchase of $15,374 of 6% paving bonds.

NEW YORK, N. Y.—Bids are asked until Nov. 27 for grading 108th St., and until Dec. 2 for paving portions of four streets with asphalt and one street with granite blocks. Wm. Brookfield, Comr. Pub. Wks.—Bids are asked until Dec. 3 for traprock paving in one street. L. F. Haffen, Comr. St. Improvements, 2622 Third Ave.

WARSAW, N. Y.—A meeting of the supervisors is to be held Dec. 2 to consider the question of constructing roads.

WHITE PLAINS, N. Y.—A meeting of the supervisors is to be held Nov. 25 to consider the question of constructing roads. Joseph B. See, Treas. Agricultural Society, Supervisor, Valhalla, N. Y.

NEW BRUNSWICK, N. J.—Bids are asked until Dec. 4 for macadamizing the road from Stelton to Dunellen and New Market, six miles, and from Spotswood to Old Bridge, 13,076 ft. John F. Ten Broeck, Chn. Road Com.; Henry S. Garretson, Dir. Bd. Freeholders, New Brunswick.—The council will soon ask for bids for flagging sidewalks, 4½ ft. wide, and curbing and paving Somerset St. from Division St. to Alexander St.

SCRANTON, PA.—John E. Roche, Scranton, writes us that nothing has been done towards the improvement of the Providence & Abington Turnpike, excepting an effort in the direction of clearing the subject of the legal complications in which it is enveloped.

NEW ORLEANS, LA.—Bids are asked until Nov. 25 for asphalt paving in two streets. Chas. R. Kennedy, Comptroller.

CINCINNATI, O.—Bids are asked until Dec. 16 for macadamizing in Ernst St. A. P. Butterfield, Clk.

CLIFTON, O.—Bids are asked until Dec. 7 for improving West Ave. Engr., Arthur S. Hobby, 227 Main St., Cincinnati; S. G. Sterling, Clk.

TOLEDO, O.—Bids are asked until Dec. 2 for 16,460 sq. yds. of paving, 10,000 sq. yds. of grading, and 7,460 lin. ft. of curbing in South St. Lem. P. Harris, Cy. Clk.

ROCKVILLE, IND.—Bids are asked until Dec. 9 for constructing a gravel road. Address Claude Ott.

CHICAGO, ILL.—The west side park commissioners recently received bids for constructing the Garfield Park racetrack, estimated to cost about $12,000, but it is probable that new bids will be asked.—The council proposes to pave portions of 15 streets with cedar blocks.

RACINE, WIS.—The question of paving College Ave. and 14th St. is being considered.

SAN FRANCISCO, CAL.—It is proposed to construct artificial stone sidewalks in a number of streets. Thos. Ashworth, Supt. Sts.; A. J. Donovan, Deputy.

SAN FRANCISCO, CAL.—It is proposed to pave Folsom St. with bitumen. J. J. McEwen, A. B. Maguire and H. B. Russ, of the Folsom St. Improvement Club, are interested.

MANUFACTURING PLANTS.

BARRE, VT.—Allen & Richardson are reported as to commence work at once on their new wood-working plant. The shop will be 48 × 50 ft.; engine room, 12 × 15 ft.—The Vermont Granite Co. will commence work at once on its new buildings. The planing mill will be the first structure erected.

BOSTON, MASS.—John Reese is erecting a four-story brick building, 350 × 70 ft., which will contain 122,500 sq. ft. of floor space. The main engine will be built by the Slater Engine Co. and will be of 200 HP. of the two-cylinder type. The building will be occupied by the Reese Button-Hole Machine Co., and will need new machinery.

SOUTH BRAINTREE, MASS.—It is stated that the New York, New Haven & Hartford R. R. Co. will at once commence the erection of repair shops and a large power house at this place.

SPENCER, MASS.—A company under the name of the Massasoit Knitting Co., is being formed, and will occupy the Bullard & Temple Building, corner Main and Grove Sts. It is understood that Roswell O. Holden and Frank A. Drury are interested.

PROVIDENCE, R. I.—It is stated that a new cotton mill is to be built at Centreville, work to be commenced on the building in the spring. It is understood that $375,000 of the $500,000 needed has been subscribed. Harold Lawton, of the Lapham Mills, Centreville, is to be in charge of the new mill.

MONTVILLE, CONN.—A report states that a bicycle factory will be erected in this place. John Anderson has the contract for the stonework.

BROADALBIN, N. Y.—The Daniel Reddish knitting mill at Broadalbin, Fulton county, was recently burned; loss, $30,000. The mill was operated by Robert Wilson.

TROY, N. Y.—Wm. Connors, proprietor of the Troy Paint & Color Works, 677 River St., North Troy, is reported about to commence the erection of a three-story brick building, to be used in connection with his plant.

BLAIRVILLE, PA.—It is stated that the Victor Mfg. Co. has decided to triple the present capacity of its plant.

CALIFORNIA, PA.—W. S. Marble, of Pittsburg, and others, have purchased ground near this place, according to press reports, and have placed the contract for a large building, which will be used for the manufacturing of chairs and furniture.

HAZLETON, PA.—A. Wagner, Arch., 67 University Place, New York city, is reported to have completed arrangements for drawing the plans for the proposed new brewery.

PHILADELPHIA, PA.—The wire nail mill of Philips, Townsend & Co., at North Penn Junction, was recently destroyed by fire; reported loss, $175,000.

PUNXSUTAWNEY, PA.—A representative of Rogers, Brown & Co., blast furnace operators, has been in Punxsutawney, seeking a site for the location of a new plant. It is understood that Adrian Islin is interested. The plant proposed is to cost $300,000, and will give employment to 300 men. A meeting will be held to discuss the subject.

YORK, PA.—The plant of the York Wall Paper Co. was recently destroyed by fire; reported loss, $150,000; insurance, $90,000.

WASHINGTON, PA.—It is reported that a steel plant will be established in this place by Samuel F. Patterson, of Pittsburg, and others, and that the company intends to erect a plant for the manufacture of solid steel elastic single-trees, etc. About 50 men will be employed. Capital stock will be $240,000. E. G. Sugden, of Pittsburg, will be Manager.

FAYETTEVILLE, N. C.—Another company is now being formed (making the third) to build a 10,000-spindle cotton mill at this place. Address M. J. Gorman, Raleigh, N. C.

GASTONIA, N. C.—G. A. Gray will, according to reports, build a cotton mill at this place to contain 5,000 spindles and 250 looms.

ROME, GA.—Dr. R. T. Trainer, of Chester, Pa., and local associates, will build a $200,000 cotton mill at this place early next year.

JACKSON, MISS.—Gen. Wm. Henry and associates will build a $200,000 cotton mill at this place.

LEXINGTON, KY.—G. A. Bobrich, of Boston, Mass., will, according to press reports, establish a desk manufacturing plant at Lexington if the city will provide an acre of ground on the line of a railway, and will erect a building to cost from $3,000 to $5,000. Mr. Bobrich will furnish the necessary machinery at a cost of from $25,000 to $45,000.

CLEVELAND, O.—It is said that the Carnegie Steel Co. proposes locating a rolling mill and blast furnace in this city, and that the company has secured an option on several pieces of property.

CLEVELAND, O.—Ludwig Herman, Valentine Morris, John P. Cowing, A. T. Brewer, and U. S. Martuin, of Cleveland, have incorporated the Herman Engineering Co., which will manufacture machinery and structural work; capital stock, $100,000.

CINCINNATI, O.—The Banner Brewing Co.'s plant was destroyed by fire on Nov. 17. Reported loss, $250,000; well insured.

MANSFIELD, O.—It is stated that the Harness Mfg. Co. will commence work on the buildings at once. Machine shop is to be 65 × 200 ft., one-story, brick; the foundry will be 100 × 110 ft. Pres., Robert G. Hancock; Secy., T. R. Barnes.

SOUTH MANSFIELD, O.—The Barnes Mfg. Co., which was recently formed with a capital stock of $100,000, is reported about to commence work on its buildings, and will erect a two-story brick machine shop, 65 × 200 ft., and a foundry 100 × 100 ft. The company will manufacture brass and iron pumps, etc. Pres., Robert G. Hancock; Treas., E. J. Gilbert.

SANDFORD, IND.—It is reported that J. J. Bolton will erect a factory building of brick, 30 × 48 ft., four stories high, with an engine house, 20 × 30 ft., two stories high, and a boiler house, 20 × 30 ft., one story high. A Corliss engine, 14 × 30 ins., will be required. No contracts for steam plant have yet been closed except for the boilers.

CHICAGO, ILL.—It is stated that the Birk Bros. Brewing Co., 9 Webster Ave., will build a two-story and basement stock-house and brewery, of brick and stone, to cost $12,000. Archs., Louis Lehle Co., 103 Randolph St.—J. Lauth, 16 North Canal St., will build a three-story and basement brick and stone factory, 45 × 150 ft., at 37-39 Wright St., to cost $25,000, lighted by electricity, heated by steam, equipped with engines and boilers. Archs., Leafgreen & Bros., 5918 La Salle St.

ROCKFORD, ILL.—Plans have been prepared for the new buildings to be erected by Madigan & Walsh, cooperage firm; two buildings, two stories high, 75 × 30 ft. and 60 × 70 ft., will be built.

MARSHFIELD, WIS.—The Wisconsin Hoop Co. is erecting a hoop factory, 70 × 90 ft., with wing, 27 × 62 ft., and engine room, 32 × 32 ft., and will use two 80-HP. boilers and one 80-HP. engine.

FARIBAULT, MINN.—It is stated that B. B. Sheffield has closed a deal for the Polar Star mill property, and will at once erect a plant worth $100,000.

MINNEAPOLIS, MINN.—It is understood that the Douglas Grain Co. is about to erect an elevator, mill, power house and warehouse at the corner of Delaware and Erie Sts., Southeast, at an estimated cost of $33,000.

DAVENPORT, IA.—A press report states that a company will be organized with a capital of $50,000 to manufacture well-drilling machinery; C. T. Hancock, of Davenport, and W. J. Young, of Clinton, are interested.

STERLING, NEB.—The mill and elevator owned by O. A. Cooper was recently burned; reported loss, $60,000; insurance, $25,000.

SALT LAKE CITY, UTAH.—A report states that the owners of the April Fool mines will put up a mill for the treatment of their ores, having a capacity of ten stamps, with a cyanide plant equal to the crushing capacity.

MISCELLANEOUS CONTRACTS AND SUPPLIES.

STEAM ROAD ROLLER.—Gouverneur, N. Y.—The citizens are agitating the question of purchasing a steam road roller, according to reports.

FIRE ENGINES.—Toronto, Ont.—Bids are asked until Dec. 2 for furnishing the city one or more steam fire engines. Geo. McMurrich, Chn. Com.

PILING.—St. Louis, Mo.—Bids are asked until Dec. 11 for furnishing and delivering 62,528 lin. ft. of longleaf yellow pine piling. Maj. Chas. R. Suter, 1515 Locust St.

STEEL FORGINGS.—Washington, D. C.—Bids are asked until Nov. 26 for 46,400 lbs. of steel forgings and 42,000 lbs. of steel castings for the Washington navy yard. Edwin Stewart, Paymaster General, U. S. N.

STREET CLEANING.—Jersey City, N. J.—Bids are asked until Nov. 25 for cleaning the streets of the city, and the removal of ashes and garbage, for the term ending Dec. 1, 1896. Geo. T. Bouton, Clk. Comrs.

STONE CRUSHER.—Nantucket, Mass.—The town is reported to have appointed a committee, consisting of Wm. W. Burgess, Wm. H. Norcross and D. W. Gibbs, with power to purchase or hire a stone crusher for work on the roads.

EARTHWORK.—Thurber, Tex.—Bids are asked until Nov. 25 for about 40,000 cu. yds. of earthwork in the construction of a dam at Thurber, Tex., for the Texas & Pacific Coal Co. For information apply at the general offices in Hurley Bldg., Fort Worth, or to W. K. Gordon, Supt., at Thurber, Tex.

CANAL WORK.—New Orleans, La.—Local papers state that J. B. Camors & Co., local South American traders, have agreed to improve the old Mississippi & Mexican Gulf Canal, between the river and Lake Borque, for $72,500. Lock and levees will be built and the channel straightened. E. H. Farrar, of New Orleans, representing W. D. Wheelwright and other New York capitalists, is interested.

GAS PLANTS.—Asbury Park, N. J.—It was reported that the gas and electric light plants of Long Branch, Red Bank and Asbury Park, N. J., with franchises covering the ocean front from Seabright to Sea Girt, about 20 miles, have been bought by a syndicate organized by Emerson McMillan & Co., bankers, of New York, N. Y. It is said that the plans propose an equipment large enough to produce 250,000,000 cu. ft. of gas a year for lighting and fuel.

SEA WALL AND FILLING.—Chicago, Ill.—Local papers state that H. H. Gross, of the Brownell Improvement Co., Tacoma Bldg., has been awarded the contract for about 2,000,000 cu. yds. of filling for the proposed lake front improvements, and that the contract for driving the piles and building about 7,000 lin. ft. of sea wall has been let to Hiero B. Herr & Co. The work will be done by the Illinois Central R. R. Co. under the direction of Maj. W. L. Marshall, U. S. Engr.

LIGHT-VESSEL.—Washington, D. C.—The following bids are reported to have been received Nov. 8 for the construction and delivery of one first-class composite light-vessel, No. 67:

Moran Bros. & Co., Seattle, Wash.	$75,880
*George Lawley & Son, Corp., Boston.	96,500
Fulton Eng. & Shipbuilding Wks., San Francisco.	123,000
* John H. Dialogue & Son, Camden, N. J.	76,400
Chas. Reeder & Son, Baltimore, Md.	79,750
Pusey & Jones Co., Wilmington, Del.	83,000
Union Iron Works, San Francisco, Cal.	95,000
*Bath Iron Works, Bath, Me.	63,900
James Woodall, Baltimore.	76,234
John F. Steffen, Portland, Ore.	69,760
Bell Steam Engine Works, Buffalo, N. Y.	86,750
** Atlantic Works, Boston, Mass.	93,500

* Delivered at Tompkinsville, N. Y.; all others, Astoria, Ore.

** $93,500 at Astoria, or $75,900 at Boston.

CONTRACT PRICES.

WATER-WORKS.—Mount Sterling, O.—The contract for contructing works, for which bids were opened Nov. 12, has been awarded to W. R. Richards, of Mount Sterling, at the following prices: Pipe, $21,45 a ton; special castings, 2½ cts. a lb.; 8-in. valves, $15.50 each; 6-in., $10; 4-in., $6; valve boxes, $2.50; 4-in. hydrants, $21; laying 8, 6 and 4-in. pipe, 20, 13 and 12½

cts. a ft., respectively; pipe system complete, $6,066; reservoir, $1,425; brick pumping station, $2,000; pump, $1,000; deep well pump, $350 or $700; complete, $10,931. The Ohio Pipe Co., Columbus, bid $21.40 a ton for 8 and 6-in. pipe; $22 for 4-in. pipe, and 2½ cts. a lb. for specials; Addyston Pipe & Steel Co., $23.15, $24.15 and 2½ cts. The Bourbon Copper & Brass Works bid $15.50, $10, $6 and $2.50 for 8, 6 and 4-in. valves and valve boxes, respectively; Ludlow Valve Mfg. Co., $16.42, $10.98, $6.60 and $2.65; R. D. Wood & Co., $17, $11.50, $7 and $2.75; Crane Co., $15.25, $9.75, $5.75 and $2.50. The other bidders for the pipelaying and reservoirs were Taft & Dole, of Columbus; S. W. Holby, of Pan-coastburg, O. John W. Hanawalt, Clk., Mount Sterling; E. C. Cooke, Consult. Engr., Cleveland.

MACADAMIZING.—Paterson, N. J.—A. B. Pearce, Clk., writes us that the following bids were received by the county freeholders Nov. 11 for macadamizing about 2.4 miles of road in West Milford township:

Bids Received for Macadamizing a Road in West Milford Township, N. J.

Quantities.		Bunn & Daniels, Little Falls, N.J.	Colfax & Steele, Pompton, N.J.	Daniel & Stanley, Little Falls, N.J.	Jos. Puglia, Paterson, N.J.	Ed. W. Burger, Paterson, N.J.	Francisco Bros., Little Falls, N.J.	Sisco & Cook, Bloomingdale, N. J.
4 ins. macadam	20,114 sq. yds.	$0.27	$0.25	$0.25	$0.35	$0.28	$0.27	$0.322
Earth excavation	5,000 cu. "	.20	.192	.25	.20	.20	.26	.30
Solid rock excavation	2,233 " "	1.00	.80	1.25	.20	1.00	.98	1.00
Loose " "	2,314 " "	.30	.60	.27	.20	.60	.60	.75
12-in. pipe	100 ft.	.75	.60	.40	.67	.65	.70	.75
8-in. "	50 "	.60	.30	.25	.67	.50	.50	.625
Cobblestone paving	150 sq. yds.	.47	.35	.35	.67	.25	.60	.50
Totals		$9,533	$9,728	$9,800	$10,010	$10,381	$10,493	$12,188

PAVING.—Philadelphia, Pa.—Bids were opened Nov. 19 for about $500,000 worth of paving on a concrete foundation, with guarantee of five or ten years, the prices ranging as follows: Pennsylvania granite blocks, average bid, $3.45; Eastern granite blocks, $3.30 to $3.75; vitrified brick, $1.90 to $2.39; asphalt, about $2.35 per sq. yd.

SEWER AND CHANNEL.—Brookline, Mass.—The total bids for constructing a brook channel and sewer were published last week. A. H. French, Town Engr., informs us that the itemized bids were as follows, the contract being awarded to M. J. O'Hearn; all pipe, brick, cement, castings and cut granite to be furnished by the town and delivered as near to the work as can be conveniently done; engineer's estimate, $27,825:

Bids Received at Brookline, Mass., for Constructing a Brook Channel and Sewer.

Bidder.	1,750 ft. excav. for 51 × 40-in. channel.	1,170 ft. excav. for 42 × 40-in. channel.	575 ft. excav. for 24 × 30-in. channel.	225 ft. of 10-in. drain.	700 ft. of catchbasin outlets.	1,340 ft. 15-in. pipe sewer on earth found'n.	420 ft. 15-in. pipe sewer on pile found'n.	750 ft. of 10-in. pipe sewer.	1,850 ft. of 8-in. pipe sewer.	3,000 ft. of 8-in. underdrain.	1,500 ft. of 4-in. underdrain.	2,000 ft. of piling.	33 M. ft. B. M. timber foundations.	500 cu. yds. foundation concrete.	500 cu. yds. haunch wall concrete.	600 cu. yds. of arch concrete.	180 cu. yds. of brickwork.	1,100 sq. yds. of plastering.	10 brick catchbasins.	20 storm catchbasins.	100 cu. yds. of rubble masonry.	Total.
*King & Hodge, Brookline	$0.70	$0.60	$0.70	$0.50	$0.35	$0.50	$1.50	$0.60	$0.64	$0.14	$0.12	$0.20	$0.30	$4.00	$4.25	$5.00	$4.75	$0.40	$10.00	$20.00	$4.75	$19,528
M. J. O'Hearn, "	1.25	1.00	.80	.40	.35	1.60	1.25	.70	.76	.10	.10	.12	27.00	3.25	3.25	3.25	5.50	.10	20.00	30.00	5.00	19,783
Dennis Driscoll, "	1.75	1.50	.78	.60	.50	.85	1.20	.85	.80	.25	.15	.19	30.00	2.60	3.00	3.50	5.00	.25	18.00	25.00	4.00	22,432
D. F. O'Connell, Boston	1.40	.95	.60	.53	.40	1.10	1.15	.67	.75	.20	.10	.23	27.00	4.00	4.00	5.00	5.10	.25	20.00	10.00	5.00	23,592
Metropol'n Const. Co., Bost.	1.90	1.43	.89	.65	.69	1.29	1.75	.96	1.05	.10	.10	.18	40.00	4.19	4.25	4.50	5.25	.40	20.00	20.00	4.75	26,109
Jas. Driscoll, Jr., Brookline.	2.00	1.75	.75	.60	.40	1.25	1.33	.75	.75	.20	.15	.20	30.00	5.00	5.25	5.25	5.00	.50	18.00	10.00	4.00	27,017
T. J. Kelly, Brookline	1.00	.80	.60	.60	.30	3.00	2.50	1.50	1.50	.25	.20	.10	25.00	4.00	4.00	6.00	12.00	.15	25.00	30.00	5.00	27,296
P. H. Bryne & Co., Malden.	1.70	.95	.80	.60	.50	1.30	1.50	.90	.80	.25	.15	.25	35.00	4.50	4.50	7.00	5.50	.20	30.00	20.00	3.50	27,649
Craib & Trumbell, Winthrop	1.40	1.50	1.80	.50	.45	3.00	3.00	.75	.70	.35	.25	.25	35.00	4.00	4.50	5.00	6.00	.15	20.00	15.00	4.25	29,100
F. A. Snow, Brookline	1.50	1.50	1.10	1.00	.80	1.25	1.75	1.25	1.20	.25	.25	.25	25.00	5.00	5.00	5.00	6.00	.10	20.00	20.00	5.00	29,605
N. McBride, Brighton, Bost.	1.80	1.80	1.20	.65	.40	1.40	1.50	1.00	.80	.25	.15	.40	33.00	4.50	4.50	4.50	14.00	.25	20.00	16.00	4.00	32,087

* Informal, on account of error in item.

BRICK PAVING.—Albany, N. Y.—The contract for paving Central Ave. with brick has been awarded to T. Henry Dumary. The work will require about 2,225,000 brick, and all the bidders specified Catskill repressed brick. The bids were opened Nov. 18, and were as follows:

Quantities.		Callanan Road Impvt. Co., Albany.	T. H. Dumary, Albany.	*Homer & Co., Olean, N. Y.
Vitrified brick paving	41,140 sq. yds.	$1.75	$1.82	$1.80
Straight curbing	12,500 lin. ft.	.75	.50	.70
Circular "	424 " "	1.00	.50	.90
Pavement relaid	300 sq. yds.	.50	.30	.20
Curb relaid on concrete	20 lin. ft.	.50	.30	.20
" " " sand	150 " "	.50	.30	.05
New brick sidewalk	30,000 sq. "	.08	.07	.055
" flag " 4-ft.	12,000 " "	.12	.14	.12
" " " 5-ft.	2,000 " "	.14	.16	.12
" " " 6-ft.	1,000 " "	.16	.18	.125
Relaying sidewalk	180,000 " "	.03	.025	.02
Days to complete work, at $5 a day		120	100	90
Totals		$92,309	$90,758	$90,460

* Informal, bid not indorsed.

BRICK AND GRANITE PAVING.—Albany, N. Y.—The contract for paving Dove St. with vitrified brick and granite blocks, on 6 ins. concrete, has been awarded to T. Henry Dumary. Each bidder included the Catskill in the brick submitted. The bids were as follows, all the bidders being residents of Albany:

Quantities.		Callanan Road Impvt. Co.	T. H. Dumary.	E. F. Dillon.
Granite blocks	710 sq. yds.	$2.66	$2.74	$2.65
Vitrified brick	5,570 " "	1.88	1.85	1.87
6-in. granite curb, str'ht.	3,470 lin. ft.	.70	.45	.87
" " " circular.	144 " "	.70	.45	.87
Relay. old blocks on con.	13 sq. yds.	1.50	1.30	1.00
" old walks, etc., sand.	40 " "	.25	.30	.15
" curb on concrete	226 lin. ft.	.35	.15	.17
" " " sand	200 " "	.25	.10	.12
New brick sidewalks	7,600 sq. ft.	.06	.06	.06
" flag "	1,700 " "	.15	.16	.14
Relay. old walks on sand.	4,300 " "	.05	.05	.03
Receiv'g basins, complete	2	70.00	70.00	70.00
No. days to compl. work, at $5 day		33	25	45
Total bid		$16,280	$15,230	$16,705

SEWERS AND TUNNEL.—Waterbury, Conn.—It is reported that the following bids were received by R. A. Cairns, Cy. Engr., Nov. 6, for constructing 1,008 lin. ft. of 15-in. vitrified pipe sewer, of which 790 ft. is to be laid in a tunnel driven through rock, and 290 lin. ft. of 8-in. vitrified pipe sewer:

Quantities		Thos. Murphy, Hartford.	Edw. McManus, Waterb'y.	Washburn & Washburn, New York.	Brown & Keene, Central Falls, R. I.
15-in., in open cut	368 lin ft.	$11.00	$4.10	$2.00	$3.50
15-in., " 4x6-ft. tun.	750 " "	11.00	16.00	8.50	4.00
8-in. " open cut	290 " "	6.00	1.50	1.00	1.40
Manholes in 15-in. sewer, each.		40.00	135.00	150.00	90.00
" " 8-in. " "		20.00	45.00	30.00	90.00
Portland cement, extra		3.00	2.00	2.50	....
Totals		$14,720	$14,430	$8,030	$5,377

* Informal, no certified check.

ASPHALT PAVING.—Brooklyn, N. Y.—Cranford & Co., of this city, were the lowest bidders Nov. 15 for paving portions of two streets with asphalt over the present cobblestone pavement, and six streets with asphalt on a concrete foundation, at $1.17 per sq. yd. for asphalt paving, 30 cts. per lin. ft. for old curb redressed, 70 cts. for new curb, 20 cts. per sq. yd. for repairing cobblestone pavement, 3 cts. per sq. ft. for reflagging, 25 cts. per sq. ft. for bluestone bridging, $4.20 per cu. yd. for concrete foundation; total, $94,559. The Eastern Bermudez Asphalt Paving Co. submitted the lowest bid for 708 sq. yds. of asphalt paving on concrete foundation in one street, at $1.30 per sq. yd. for paving, 20 cts. per lin. ft. for old curb redressed, 70 cts. for new curb, $4.20 per cu. yd. for concrete, 3 cts. per sq. ft. for reflagging; total, $1,556. The Brooklyn Alcatraz Asphalt Co. and the Fruin-Bambrick Construction Co. were the other bidders. N. P. Lewis, Engr. of Local Improvements.

WATER-WORKS.—Lockport, Ill.—The following bids were received, Nov. 7, for a distribution system, as advertised in Engineering News; W. S. Shields, Engr., Chicago:

Bids Received, Nov. 7, for Distribution System, Lockport, Ill., Water-Works.

Bidder.	Pipe & pipelaying. 10-in., 5,200 ft.	8-in., 6,715 ft.	6-in., 18,555 ft.	4-in., 13,780 ft.	Valves. 10-in., 4.	8-in., 8.	6-in., 29.	4-in., 27.	Valve boxes, 98.	Hydrants, 73.	Rock excav. Loose, 25,000 cu. ft.	Solid, 20,000 cu. ft.	Total bid for bonds.	% deduct'd	Total bid for cash.
Engineer's estimate	$1.10	$0.85	$0.70	$0.50	$25.00	$20.00	$13.00	$8.00	$3.00	$27.00	Included		$34,334	.	.....
Murphy & Healy	1.05	.83	.67	.52	23.00	17.00	11.00	6.60	3.00	23.00	$0.04	$0.06	35,439	6	$33,313
Thacher & Burke	.93	.69	.57	.425	24.00	17.00	12.50	7.25	3.00	24.00	.07	.15	33,398	.	.....
J. R. McDonald & Co.	.97	.76	.63	.47	23.00	16.50	12.00	7.20	4.00	24.50	.04	.09	33,941	6	31,904
C. & T. Iglehart	1.09	.79	.625	.43	24.75	18.00	12.50	7.50	3.00	26.25	.015	.06	32,988	7	30,688
Rockford Const'n Co.	.97	.71	.57	.40	26.00	20.00	12.50	8.50	3.00	25.00	.05	.09	31,835	5	30,243
Campbell, Dennis & Co.	.99	.76	.61	.39	24.87	17.75	11.50	7.50	2.60	23.00	.10	.15	35,077	2½	34,200
Dennis Cleary	1.03	.76	.60	.44	27.10	19.00	12.80	7.90	3.50	23.60	.03	.14	34,250	6	32,176
T. H. Riley	1.275	1.025	.735	.57	19.50	15.00	9.00	6.00	3.00	24.00	Included		37,582	.	.....
Thos. F. Ryan	1.285	1.025	.745	.58	20.50	16.00	10.25	7.00	3.25	25.00	.025	.05	39,815	.	.....
R. C. Morrison*	.745	.55	.45½	.34	21.40	14.90	8.90	5.95	2.38	20.95	.025	.04	24,412	4	23,435

* Earth excavation at 1½ cts. per cu. ft.

METAL MARKET PRICES.

LEAD.—New York: 3.17 to 3.2 cts. Chicago: 3.05 to 3.07 cts. St. Louis: 2.95 to 3 cts.

BARB WIRE.—Pittsburg: $2.70 and $2.80 for galvanized, and $2.30 and $2.40 for painted in carload and less than carload lots at mill.

FOUNDRY AND PIG IRON.—New York: $12.50 to $14.50. Pittsburg: $12.75 to $15. Chicago: $13 to $15.50.

TRACK MATERIAL.—New York: angle bars, 1.45 to 1.5 cts.; spikes, 1.8 to 1.85 cts.; track bolts, 2.15 to 2.25 cts. with square, and 2.25 to 2.4 cts. with hexagon nuts. Chicago: angle bars, 1.65 to 1.8 cts.; spikes, 1.9 to 2 cts.; track bolts, 2.25 to 2.3 cts. with square and 2.45 to 2.5 cts. with hexagon nuts.

NAILS.—Pittsburg: $2.25 per keg for carload lots and $2.35 for less than carload lots, at mill; $2 and $2.05 for cut nails at mill. Chicago: $2.35 and $2.45 for wire nails, $2.17 and $2.25 for cut nails. New York: $2.3 and $2.4 for wire nails, and $2.18 and $2.28 for cut nails.

RAILS.—New York: $28 at eastern mills and $28.75 at tidewater; old rails, $15 to $15.50 for iron, and $13 for steel; light rails, $29; girder rails, $26. Pittsburg: $28 for standard sections of 45 lbs. and over. Chicago: $29 to $31 for standard sections; $28 for light sections; old rails, $16.50 to $16.75 for iron, and $12.50 to $13.50 for steel.

STRUCTURAL MATERIAL.—New York: beams, 1.75 to 2.1 cts.; channels, 1.7 to 1.8 cts.; angles, 1.65 to 1.7 cts.; tees, 1.8 to 1.9 cts.; universal mill plates, 1.7 to 1.8 cts.; steel plates, 1.65 to 1.75 cts. for tank, 1.9 to 2 cts. for shell, 2.1 to 2.25 cts. for flange, 2.4 to 2.5 cts. for ordinary firebox, 2.6 to 2.75 for locomotive firebox. Pittsburg: beams, 1.6 to 1.85 cts; channels, 1.6 to 1.85 cts.; angles, 1.4 to 1.5 cts.; tees, 1.6 cts.; Z-bars, 1.6 cts.; universal mill plates, 1.8 to 1.9 cts.; steel plates, 1.6 to 1.65 cts. for tank, 1.7 to 1.75 cts. for shell, 1.8 to 1.85 cts. for flange, 2.5 cts. for ordinary firebox, 2.5 to 4 cts. for locomotive firebox. Chicago: beams, 1.8 to 1.9 cts.; channels, 1.8 to 1.9 cts.; angles, 1.75 to 1.85 cts.; tees, 1.95 to 2 cts.; universal mill plates, 1.95 to 2.05 cts.; steel plates, 1.85 to 1.9 cts. for tank, 2.1 to 2.15 cts. for flange, 2.8 to 2.9 cts. for ordinary firebox, 4 to 4.5 cts. for locomotive firebox.

INDUSTRIAL NOTES.

THE CARLISLE MFG. CO., of Carlisle, Pa., has a contract for building 200 freight cars.

R. S. WRIGHT & CO., of Pittsburg, Pa., will erect the dome for the Yerkes observatory, Lake Geneva, Wis.

THE CAMBRIA IRON CO. has resumed operations at its furnace at Gaysport, Pa., which has been idle for about five years.

THE LANE & BODLEY CO., of Cincinnati, O., is shipping to parties in Lerma, Mexico, a 100-HP. Corliss engine and equipment.

THE CARNEGIE STEEL CO., Ltd., of Pittsburg, Pa., has completed four new 30-ton open-hearth furnaces at Homestead, Pa.

THE JOHN H. GRUHL MACHINE CO. has been recently located at Rock Island, Ill., and will manufacture engines, steam pumps, etc.

THE BIRMINGHAM ROLLING MILL CO., of Birmingham, Ala., is adding a guide mill, a sheet mill and four rolling mills to its plant.

BRYAN & McKIBBIN, 120 Broadway, New York city, have been appointed general agents for the Buffalo Scale Co. and for Roberts, Throp & Co.

THE LAIDLAW-DUNN-GORDON CO., of Cincinnati, O., will ship this week five carloads of pumping machinery to Ireland and England, also one carload to Cuba.

THE BUCYRUS STEAM SHOVEL & DREDGE CO., of South Milwaukee, Wis., will be reorganized on or about the first of the year, according to the "Milwaukee Journal."

THE COATESVILLE BOILER WORKS, of Coatesville, Pa., is completing for the Southern Electric Light Co., of Philadelphia, a battery of boilers aggregating 2,500 HP.

THE OWEN MACHINE & TOOL CO., of Springfield, O., is largely increasing its output, and a report states that the company will increase its floor space about 50% in the spring.

THE DAMASCUS BRONZE CO., of Pittsburg, Pa., is enlarging its plant by the addition of a 700-lb. pot and a new core oven, which will increase the capacity to 600,000 lbs. per month.

THE GATES IRON WORKS, of Chicago, Ill., has just shipped, according to reports, 15 carloads of machinery to South Africa, including three large Corliss engines and several rock and ore crushers.

THE STRUTHERS IRON & STEEL CO., of Struthers, O., has rebuilt its sheet mills at that place. A new warehouse and annealing room have been built, and a cold-rolling mill will soon be added.

THE RICHMOND LOCOMOTIVE & MACHINE WORKS, of Richmond, Va., is improving its plant by adding a 250-HP. Corliss engine and other machinery, enlarging the foundry and building a new blacksmith shop.

THE LOUISIANA ELECTRIC LIGHT CO., of New Orleans, La., recently went into the hands of receivers, Judge Pardee, of the United States Circuit Court, appointing George Q. Whitney and A. S. Badger as receivers.

THE J. A. FAY CO., of Cincinnati, O., has just completed a translation of its catalogue into the Russian language. The company recently circulated through South America a catalogue in Spanish, with marked results.

KELLY & JONES, of Greensburg, Pa., have received a large contract for iron and brass goods from Augara Bay, South Africa, near the Cape of Good Hope. The sale was made in direct competition with foreign manufacturers.

THE INTERNATIONAL STEEL POST CO., of St. Louis, Mo., Julius W. Koch, Pres., has removed its office to 710 Chestnut St. The company reports an increased demand for its steel posts, both for railroad and agricultural fencing.

THE MARYLAND STEEL CO., of Baltimore, Md., recently started up the fires in furnace A, at Sparrow's Point, giving employment to 100 men. It is stated that the whole plant will be put in full operation in a few weeks, giving employment to 800 men.

THE SOUTHWARK FOUNDRY & MACHINE CO., of Philadelphia, Pa., recently sold a 12-in. centrifugal pump to the Carnegie Steel Co. for its Duquesne works; also a 32×48 Porter-Allen engine to the Pittsburg Reduction Co. for its rolling mill at New Kensington, Pa.

THE BIRMINGHAM BOLT & NUT WORKS, of Birmingham, Ala., has succeeded the Birmingham Nut & Bolt Co., and will manufacture large bolts, nuts, rods, plates and forgings for builders, contractors, mines, etc. Pres., Edward Phillips; Secy. and Treas., H. A. Parrott.

STRUTHER, WELLS & CO., of Warren, Pa., have completed the erection of a stand-pipe 16 ft. in diameter and 100 ft. high for the water-works of Montgomery, N. Y. They also have a contract to erect a stand-pipe at Somersworth, N. H., to be 40 ft. in diameter and 95 ft. high.

THE JACKSON FILTER CO., 312 North 4th St., St. Louis, Mo., has recently secured the following contracts for putting in filter plants: water-works plants at Oswego, Kan., and Cameron, Tex.; Loose Bros.' factory and the Blossom hotel, both of Kansas City, Mo., and a manufacturing plant at Louisville, Ky.

THE STOCKHAM MFG. CO., of Chicago, Ill., recently purchased the business of Bennett & Johnson, brass founders and finishers, and the foundry of Russell Bros. & Young, manufacturers of gray iron castings, and has consolidated both lines in one establishment, and will manufacture light gray iron and brass castings.

THE GOLDEN BAR STEAM DREDGING CO., of Evanston, Wyo., recently chartered, has secured 1,000 acres of gravel bar along Snake River, in the Jacksons Hole region, and will place two dredges at work in the early spring. Pres., De Forrest Richards, of Douglas, Wyo. Geo. W. Rugby, of Chicago, and others are the incorporators.

THE WEIMER MACHINE WORKS CO., of Lebanon, Pa., has a contract from the Rosena Furnace Co., of New Castle, Pa., for a 50×60-in. blowing engine, with Weimer's patent cut-off governor and improved air cylinder, and an order from the Clinton Iron Co., Ironton, Ala., for two 42 and 84×60-in. blowing engines of the same type.

THE FLUSH TANK CO., E. L. Walcott, Pres. and Treas., 173 Lake St., Chicago, has recently secured a contract for furnishing 50 6-in. Rhoads-Williams syphons for the city of Macon, Ga. The company is also furnishing flush tanks for the sewerage system at Ann Arbor, Mich., and a large number are being put in at Richmond, Va.

THE KALAMAZOO R. R. VELOCIPEDE & CAR CO., of Kalamazoo, Mich., are making shipments this week of their No. 6 inspection velocipede cars to Russia. To Australia they are also sending six of their new railway safeties and 25 No. 1 steel velocipedes, and to Buenos Ayres they ship six of their No. 1892 steel velocipedes, for 5 ft. 6 ins. gage track.

THE CANADIAN INLAND NAVIGATION CO., of Quebec, Canada, is soon to be formed, with a capital stock of $250,000. The company proposes to build and equip, at Quebec, two strong tugs for towing ships between Quebec and Montreal, and four tugs of lighter draft for towing canal boats. Forty canal boats will also be built and will be in use between St. Lawrence River and Hudson River points.

THE HEINE SAFETY BOILER CO., S. D. Merton, Secy., St. Louis, Mo., reports that its sales for 1895 will be larger than those of any previous year. The company has orders from the De La Mar gold mines, Milford, Utah; Stratton, Independence Mine, Cripple Creek; Rockford (Ill.) Sugar Works, 1,000 HP.; Bowling Green Bldg., New York; Jones & Loughlin, Pittsburg, Pa.; Fisher Bldg., and Swift & Co., Chicago. Mr. Merton states that the company has had a large business from New England.

THE OSTENOID MFG. CO. is the name of a company recently formed by Egg Harbor, N. J., business men. Ostenoid will be manufactured—a substance of which bone is the chief element, and which, it is stated, can be used for a variety of purposes where celluloid, rubber, marble, etc., are now used, and is a non-conductor of electricity, and is not inflammable. A small plant has already been erected at Egg Harbor, and the company intends erecting a large plant at either Egg Harbor or Atlantic City.

THE DETRICK SUPPLY CO., G. F. Detrick, Secy. and Treas., St. Louis, Mo., reports that it has recently secured contracts for furnishing the following towns with the Corey fire hydrant: Warsaw, N. Y.; Vernon, Ind.; Brookfield, Mo.; Elmwood, Ill., and Columbus Junction, Ia. This hydrant has been adopted by about 50 cities and towns during the past year. A contract has recently been secured for furnishing all the gas pipe for the Burlington, Ia., gasworks. This company has the St. Louis agency for the Deming Co., of Salem, O., and the Deane Steam Pump Co., of Holyoke, Mass.

THE WHITING FOUNDRY EQUIPMENT CO., of Chicago, Ill., is constructing for the works of the Samuel L. Moore & Sons Co., Elizabeth, N. J., a cupola of the Whiting type, with an ultimate capacity of 24 tons per hour. This cupola has a shell 8 ft. in diameter, and an air chamber 10 ft. in diameter. The company is also constructing for the Richardson & Boynton Co., Brooklyn, N. Y., one No. 9 Whiting cupola having a capacity of 18 tons per hour, and a stack 50 ft. high. This company has also several orders for its electric traveling cranes, among them being contracts for the Westinghouse Co. and the Western Electric Co.

THE WAKEFIELD SHEET PILING CO., 1637 The Monadnock, Chicago, Thos. M. Nelson, Secy. and Treas., informs us that the use of its patent sheet piling is increasing rapidly. About three miles (15,000 ft.) are to be used in the Chicago lake front improvements. It has also been specified for use in making the Fox River improvements, in Wisconsin, L. M. Mann, Asst. U. S. Engr. in charge; for the Milwaukee & Winnebago R. R. Co.'s piling dock at Manitowoc, Wis., R. B. Tweedy, Ch. Engr., and in building the large dry-dock at New Orleans, La., Maj. Jos. B. Quinn, U. S. Engr. It is now in use in nearly every state and territory.

THE SKRAINKA CONSTRUCTION CO., Security Bldg., St. Louis, Mo., has enlarged the scope of its business, and is now prepared to furnish estimates for putting in complete water-works and sewerage systems, as well as estimates for all classes of railway, heavy masonry and general municipal contract work. The company is carrying an extensive building stone business under the firm name of the Atlantic Quarry & Construction Co.; Louis Skrainka, Pres.; Michael Hanick, Vice-Pres. Among contracts now under way are the Euclid Ave. district sewer, No. 2, and the North Mill Creek district sewer, No. 27; estimated cost, $60,000.

THE LINK-BELT MACHINERY CO., of Chicago, is running its works day and night, using a larger force of mechanics, foundrymen, etc., than ever before employed. The following recent contracts for electrical coal-mining machinery have been closed: Norfolk Coal & Coke Co., Norfolk, Va., two 66-in.×18-ft. boilers, one 14×16 McEwen engine, one 7-ft. chain breast machine, one enclosed electric grinder, circuits, etc.; Reed City Coal & Mining Co., Reed City, Ill., one 15×16 McEwen engine, one emery grinder, one 100-KW. dynamo, switchboard, circuits, and four 6-ft. chain breast machines; Osage Coal & Mining Co., Krebs, Ind. T., one 6-ft. chain breast machine.

NEW COMPANIES.—Millersburg Brick, Tile & Mfg. Co.; $60,000; Hoover & West, J. L. Juday and A. J. Mays.

The Diamond Cement Co., Williamsport, Pa.; $15,000.

Denverside Tool Co., East St. Louis, Mo.; $5,000; J. A. Douglas, G. O. Haugh and B. F. Hart.

The Manner-Lovett Brick Co., Belton, Tex.; $15,000; W. F. Beamer, I. A. Lovett, W. H. Mayer.

The Blunck Construction Co., Davenport, Ia.; $1,000,000; F. T. Blunck, George Klindt, H. J. Witt.

Dixie Mining & Milling Co., Spokane, Wash.; $250,000; Samuel H. Hayes, W. V. Jobes and L. L. Westfall.

The Susquehanna Construction Co., Conowingo, Md.; J. Wesley Kerr, Otto J. Fischer, John Henry Miller and others.

Union Iron Works, Portland, Ore.; $20,000; John A. Honeyman, W. B. Honeyman and Agnes Honeyman, all of Portland.

The City Fireproofing Co., New York, N. Y.; $5,000; G. W. Rader, Michael Schmidt and Charles A. Perry, of New York city.

Globe Machine Co., Indianapolis, Ind.; $20,000; Albert G. Cox, Charles B. Wanamaker, Charles A. McConnell and Henry G. Cox.

Hoyt Patent Steam Boiler Furnace Co., New York, N. Y.; $50,000; F. M. Dodd, H. C. Ives and R. Van Iderstine, of New York city.

Central City Foundry Co., Peoria, Ill.; to manufacture castings; $5,000; John W. White, Edwin W. Petefish and Herman Becker.

Western Telephone Construction Co., Janesville, Wis.; $5,000,000; George S. Parker, W. F. Palmer, and R. Van Pipelow, of Milwaukee, Wis.

The U. S. Mfg. Co., Fond du Lac, Wis.; to manufacture patented bicycle supplies; $21,000; J. E. Bean, F. J. Lang and F. J. Rueping.

The Automatic Telephone Service Co., Buffalo, N. Y.; $300,000; Oliver Watson, Edward Mitchell, Henry Koons, and others, of Buffalo.

The Hafemeister Electric & Machine Co., Cleveland, O.; $5,000; C. Hafemeister, G. C. Spallor, Henry F. Stolte, and others, of Cleveland.

Peruvian Ochre Co., New York city; to manufacture paints; $30,000; E. P. Earle, Wm. Knappman, and Charles H. Smith, 19 Liberty St.

Waterloo Gasoline Traction Engine Co., Waterloo, Ia.; $20,000; Pres., O. V. Eckert; Vice-Pres., R. Holmes; Secy. and Treas., Geo. W. Miller.

The Seneca Boiler & Machine Co., Fostoria, O.; $10,000; R. H. Black, Cornelius J. Cronin, Jesse Stephens and A. W. Aylsworth, of Fostoria.

Premier Electric Light Co., Springfield, N. J.; $50,000; Louis A. Jackson, Daniel Jackson, of New York, N. Y., and Leon Abbott, of Hoboken, N. J.

Pekor Iron Works, Columbus, Ga.; to manufacture structural iron, etc.; $25,000; Charles F. Pekor, O. C. Bullock, W. R. Brown and C. J. Edge.

Electric City Matting & Brewing Co., Niagara Falls, N. Y.; $125,000; J. S. Macklin, C. F. Hathaway, A. C. Buell and F. C. Lovelace, of Niagara Falls.

Detroit Car Axle Lubricator Co., Detroit, Mich.; $60,000, all paid in; Arthur W. Wright, Luther S. Trowbridge, Wm. Woollatt and others, of Detroit.

Carbondale Fuel Co., Des Moines, Ia.; $1,000,000; William F. Wyckoff and T. L. Rood, of New York, and R. E. Sears, P. H. Bourguet, of Des Moines, Ia.

D. Clint Prescott Co., Marinette, Wis.; to manufacture saw-mills and mining machinery, etc.; $5,000; George P. Knowles, C. M. Wilson, E. C. Prescott.

Franklin Steel Works, Kittery, Me.; $100,000, with $300 paid in; Pres., Joseph J. Durham, Boston, Mass.; Treas., Walter Franklin Pitcher, of Revere, Mass.

Universal Pressed Steel Co., New York, N. Y.; to make articles of metal, wood and slate; $20,000; John Graves, Henry V. Vultee and Charlotte A. Vultee, of Brooklyn.

The Jointless Water Pipe Co., Los Angeles, Cal.; $5,250, all paid in; Robert F. Dockery, Mary D. Dockery, Joseph C. Steelman, and others, all of Los Angeles.

The Kingman-Moore Implement Co., Peoria, Ill.; to manufacture agricultural implements, etc.; $250,000; Martin Kingman, C. A. Jamison and Gustave H. Schimpff.

Result of a FURNITURE Advertisement.

Fairfax, Va., Nov. 12, 1895.

Engineering News Publishing Co.,
New York City.

Gentlemen: Enclosed find check for our advertisement for furnishing the new county and circuit court clerk's offices with the necessary furniture and fixtures. The publication of this in Engineering News brought me about 15 letters and 3 bids. We feel that the advertisement paid us.

Yours truly,
F. W. Richardson, County Clerk.

(We have received hundreds of letters showing that our water-works, sewer, paving, electric light, public building, railway, etc., advertisements produce extensive competition from reliable contractors, and that a short advertisement in this paper is positively the most efficient as well as the most economical method of securing desirable competition for supplies or construction. The letter printed above is additional evidence that contract work of all kinds should be advertised in Engineering News, and that IT ALWAYS PAYS TO ADVERTISE WORK IN THIS PAPER.—Ed.)

MENTION THIS PAPER.

When you call upon or write to any one whose advertisement you saw in our columns, please mention Engineering News.

Willimantic Cotton Mill Corporation, Willimantic, Conn.; $120,000; Frank A. Sayles, Providence, R. I.; John S. Pye, New Bedford, Mass., and James McColl, of Pawtucket, R. I.

Electric Iron & Steel Co., Weldon, N. J.; $1,000,000, with $1,000 paid in; Jonathan F. Whipple, New York city; George Merrill, South Elberon, N. J.; Byron C. Davis, Brooklyn, N. Y.

Bettys & Mabbett Co., Rochester, N. Y.; to manufacture bicycles, machinery and other specialties; $25,000; F. A. Mabbett, Freeman H. Bettys, Phebe L. Bettys, and others, of Rochester.

The Bradford Construction Co., Bradford, Pa.; $1,000,000, with $25,000 paid in; Wm. W. Bell, C. V. Merrick, Chas. P. Collins, and Thomas J. Powers, of Bradford, Pa., and S. S. Bullis, of Olean, N. Y.

Russell-Jennings Mfg. Co., Saybrook, Conn.; to manufacture augers and bits; $200,000; Simon H. Jennings, Henry L. Shaler and Stephen E. Jennings, of Deep River, and Wilbur A. Brothwell, of Chester.

The Stiles & Fladd Press Co., Watertown, N. Y.; to manufacture presses, dies and general machinery; $60,000; G. A. Bagley, W. A. Knowlton, F. C. Fladd, E. S. Stiles and Albert Fish, all of Watertown, N. Y.

Home Telephone Co., Paterson, N. J.; to build telegraph and telephone lines in Passaic county; $300,000; Ernest J. Foord, Jersey City; P. Justus Atkinson, New York city, and George W. Atkinson, Newark, N. J.

Keystone Filter Co., Camden, N. J.; $10,000, with $1,000 paid in; Edward B. Stone, Camden, N. J.; Chas. H. Dirmitt, Edw. A. Hibbs and Robert T. Weaver, of Philadelphia, Pa., and Samuel S. Hibbs, of Rockidge, Pa.

California Mining & Development Co., of San Francisco, Cal.; $1,000,000, with $1,000,000 paid in; George S. Montgomery, Alameda county, Cal.; J. W. Ellsworth, C. H. Street, D. M. Carman and L. J. Kimball, all of San Francisco.

Eclipse Electric Lamp Co., Buffalo, N. Y.; $100,000; Thomas F. Cream, Brooklyn, N. Y.; H. F. Fulton, Elmira, N. Y.; W. G. Page, 325 Broadway, New York; W. H. Crosby, Buffalo, N. Y., and W. M. Morrison, of Montclair, N. J.

Reid Tobacco Machinery Co., Jersey City, N. J.; to deal in machinery for preparing tobacco; $1,000,000; James P. Fielder and Theodore H. Ennis, of Jersey City, N. J., and Robert Walker and Frank L. Wapscott, of Brooklyn, N. Y.

New Brilliant Tube & Pipe Works, Wheeling, W. Va.; $60,000, with privilege of increasing to $1,000,000; J. R. Jackson, New York; Thomas Hackett, Pittsburg; Joseph Speidel, W. B. Simpson, W. Fl. Stifel and George K. Wheat, of Wheeling, W. Va.

The Hartford Automatic Switch & Truck Co., Jersey City, N. J.; $500,000, all paid in; Ferdinand C. Rockwell, West Stamford, Conn.; Camillo L. Fischer, Dominick Maurer, Caspar W. Mettler, Adolf Mettler and Jacob Mettler, all of Hartford, Conn.

Eastern Machinery Co., New Haven, Conn.; to manufacture brick and clay machinery, elevator clutches, power transmission equipment, etc.; $30,000, all paid in.; F. B. Farnsworth, E. B. Beecher, J. Wheaton Stone, Lyman A. Beecher and Harry B. Brown.

Red Cloud Mining & Milling Co., Stockton, Cal.; $1,000,000, with $749,930 subscribed; C. E. Brown, of San Francisco; C. M. Jackson, D. R. Oliver, William Endicott and others, of Stockton, and J. L. Bryson, and Frederick Kidd, of Plymouth, Amandor county, Cal.

The Texarkana Oil & Delinting Co., Dallas, Tex.; to delint and extract oil from cotton seed, manufacture cotton and woolen fabrics, etc.; $30,000; B. T. Estes and W. T. Hudgins, of Texarkana, and C. E. Haydon, H. A. Rowe and F. B. T. Hollenburg, all of Little Rock, Ark.

The Circulation of Engineering News among Prominent Contractors and Contractors' Supply Men Probably Exceeds that of Any Other Five Papers in America.

ADVERTISE YOUR WORK WHERE IT IS GIVEN THE GREATEST POSSIBLE PUBLICITY.